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TECHNOLOGY ASSESSMENT AND FORECAST

U.S. DEPARTMENT OF COMMERCE/ Patent and Trademark Office

FIFTH REPORT
August 1975

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INTRODUCTION

Background

The first U. S. patent, bearing the authorizing signatures of George Washington and Thomas Jefferson, was issued on July 31, 1790. Today, in 1975, as the United States enters its Bicentennial Year, the Patent and Trademark Office is approaching issuance of the four millionth U. S. Patent.

Among these documents, which have been assembled into a classified patent file by the Patent and Trademark Office, can be found the disclosure of nearly every major technological advance that occurred, both here and abroad, during the 185 years since that first U. S. patent was granted. The patent file, therefore, represents a compendium of the history, development and current status of technology and the applied sciences. As such, the file is a tool of significant potential for many, varied uses. It is used primarily by government patent examiners and the public as the principal resource in determining the novelty and patentability of inventions.

To facilitate such use the file is divided into more than 300 major technological groupings (called Classes) which are further subdivided into nearly 90,000 technological categories (called subclasses). Since technology is dynamic, the Classes and subclasses are constantly being reviewed and restructured to accommodate the development of new technologies and changes in existing ones.

As each patent issues, it is "classified" according to the technology it discloses, into one or more of the subclasses. Copies of a patent are placed in more than one subclass when the patent contains significant technology pertinent to more than one subclass. With such multiple placement or "cross referencing" the file has grown to contain approximately 11,000,000 U. S. patent documents spanning the entire technological spectrum1/.

Since a patent obtained in the United States conveys no protection outside this country, and vice versa, it is common in this age of the "international market place", for inventors to obtain patents in more than one country. As a result, significant foreign inventions are almost always patented in the United States because it is such an important market. Thus, U. S. patent activity is representative not only of U. S. technological effort but, to a large extent, of foreign technological effort as well.

1/ The classified file also contains about 9,000,000 patents of other nations and 1,000,000 pieces of non-patent, technological literature. These documents, however, have not as yet been included in the data base from which this report stems and, therefore, are not included in the statistics presented in this publication.

For example, the growth of foreign technological capabilities in the 1960's and continuing into the 1970's has been mirrored by the growth, over the same period, of the share of U.S. patents granted to foreign resident inventors. In 1961, only about 17% of U.S. patents were issued to residents of foreign countries. However, by the end of 1974, the "foreign share" had risen to over 33%.

This apparent interrelationship between technological and patent activity has given rise to the basic premise of the Technology Assessment and Forecast program - that patent activity is an indicator and measure of technological activity, both domestic and foreign. Based on this premise, the Office of Technology Assessment and Forecast (OTAF) has issued publications which have focused on technological areas that are experiencing high levels of patenting, or in which a high proportion of the issuing patents are being granted to foreign resident inventors.

In addition, previous OTAF reports have examined the patent activity in selected areas of energy technology and have profiled, across all technology, the patenting of a selected group of states and foreign countries. In the most recent of its previous publications, OTAF reviewed the patenting of the more active U.S. and foreign corporate patentees.

About the Contents of this Publication

This report is divided into two sections. In the first section, patent activity in selected portions of the patent file is reviewed. These file portions - individual subclasses or combinations of subclasses corresponding to defined areas of technological activity - were selected for review because: 1) they have been unusually active overall; or, 2) they have been the subject of unusually heavy patenting by foreign resident inventors.

In selecting areas to review, criteria and procedures were used which differed from those employed to identify active areas included in earlier OTAF reports. These new criteria and procedures have resulted in the identification of many areas not previously covered. For three of these areas, an analysis of the thrust of the technological activity in the area is presented. Prepared by knowledgeable patent examiners, these "in depth" reports are similar to the "Level IV" type report previously included in our Initial Publication (May 1973).

These examiner reports conclude the first section of this publication.

In the publication's second section, OTAF presents, for the first time in one of its general distribution reports, patent activity data in categories corresponding to Product Fields of the Standard Industrial Classification (SIC) System.

Presentation of patent data in this manner was made possible by OTAF's development of a partial concordance between the U.S. Patent Classification System and the SIC. This work was supported by the Science Indicators

Unit of the National Science Foundation, which is using some of the data presented here in the preparation of its bi-annual Science Indicators publication.

It is felt that the availability of patent data in SIC categories significantly broadens the usefulness of such data. Patent data cover nearly all of technology on an objective, inter-technology comparable basis. In addition, such data represent a measure of technological activity. Consequently, the availability of patent data in categories compatible with the SIC - the basis of most economic data collection - opens a new dimension to study of interactions between technology and the economy.

SECTION I

ACTIVE TECHNOLOGICAL AREAS

Contents

In this Section patent activity in selected portions of the patent file is reviewed, each file portion representing a defined technological area. The reviews are divided into two groups:

- areas in which a high proportion of the U. S. patents have been issuing to residents of foreign countries (i. e. high foreign share).
- areas which have been the subject of extensive patenting in the U. S. (i. e. high overall growth)

Each of these groups is itself divided into two broad categories:

- Electrical/Mechanical Technologies
- Chemical Technologies

Thus, there are presented four collections of reviews:

1. High Foreign Share - Electrical/Mechanical Technologies
2. High Foreign Share - Chemical Technologies
3. High Overall Growth - Electrical/Mechanical Technologies
4. High Overall Growth - Chemical Technologies

Following this introduction, a table is provided for each of these four collections. Each table lists, in descending order of average percent growth or average percent foreign share, the technologies reported upon and indicates the page at which each report may be found.

Three of the areas listed on the High Overall Growth tables are indicated as the subject of an examiner report. These "in depth" reports, prepared by patent examiners knowledgeable in the field, review the thrust of the technological activity represented by the patenting in the area.

Procedures And Criteria Of Area Selection

In previous OTAF publications, areas selected for review were identified by use of a "technological grouping" method. That method employed the use of computer logic to divide the nearly 90,000 subclasses of the U. S. Patent Classification System into 8500 "technological groupings" of subclasses, all groupings encompassing relatively equal numbers of patents. These were then ranked on the basis of overall growth and foreign share, and the highest ranked groups were then examined and selections made of the areas to be reported upon.

This technique was useful in uncovering many technological areas that were experiencing a level of activity sufficient for inclusion in our publications. However, this approach, inherently, did not reveal those relatively small, active technological areas which happened to be included in technological groupings with larger inactive areas.

Therefore, for this publication, the "technological grouping" approach was not used. Instead, all subclasses were ranked independently. The primary statistical criteria for inclusion in the rankings were:

- for both the "growth" and "foreign share" rankings, a subclass had to contain no less than 100 total patents (insuring a minimum sized "bite" of technology)

- for the "foreign share" ranking, a subclass had to have an average growth rate which, for the most recent three year period, was equal to or greater than twice the average for all technology (2.5%), i.e., its growth had to be at an average rate of at least 5% (insuring a minimum level of activity in the technology)

The resulting rankings were then divided into the two categories (Electrical/Mechanical and Chemical), and in each ranking category top ranked areas (not covered in previous publications) were selected for review. These areas most often encompass a single subclass: although, for technological reasons, coverage in some areas was extended to include more than one subclass.

Explanation of Graphs and Charts

All technological areas covered (excepting those three which are the subject of "examiner reports") are reviewed on a single page, divided into four sectors, which contains:

- A description of the area (upper right sector) which includes: a brief definition of the technology included in the area; the U.S. Patent Classification System Class and subclass(es) encompassed by the area; and the growth and foreign share percentages for the most recent three year period covered in the "country table" (see below).

- A "country table" (lower left sector) which reflects the distribution of patenting during the period beginning with Fiscal Year 1965 (i.e., July 1, 1964-June 30, 1965) and ending with Fiscal Year 1974 (i.e. July 1, 1973-June 30, 1974). Shown for each year and for all years combined are: 1) total patents; 2) patents granted to residents of the United States; 3) patents granted to residents of all foreign countries; and, 4) patents granted to residents of specific foreign countries. (Countries receiving less than 2% of the foreign share of the patents are combined into an "All Other" grouping with the number of countries in the grouping indicated in parentheses).

- An activity graph (upper left sector) which more visually reflects the data presented in the "country table". U.S., foreign and total patents are illustrated for and directly above each Fiscal Year shown in the "country table."

- A patent distribution chart (lower right sector) in two parts, separated by a dotted line.

The top portion of the chart contains three bars. The top bar (of fixed length) shows the relative proportion of total patents granted in the area in the first seven years of the period covered - FY65-71 (shaded portion of bar) - as compared to the final three years of the period covered - FY72-74 (unshaded portion of bar). The meaning of bar shading (i.e., shaded portion represents first seven years of patenting, and unshaded portion represents last three years of patenting) is the same throughout the chart. The next two bars in the top portion of the chart show, respectively, U.S. and foreign patenting in the area and indicate, as well, the percent of total patents for which each accounts.

Below the dotted line, bars are shown for each country (and any "All Other" grouping) given in the "country table." The first bar in the lower portion is of fixed length and represents the patenting of the residents of the most active foreign country (in terms of total patents granted in the area). Indicated for this country and each that follow in the chart is that country's portion of the total patents granted to all foreign residents (i.e., that country's "% of foreign share"). Also indicated, in parentheses, is the specified country's portion of <u>all</u> patents granted in the area (i.e., "% of total"). [Note: Because of rounding, percentages may not, in all cases, total 100%.]

The three "examiner reports", which end this Section, differ in statistical coverage from the other areas reviewed, in that their period of coverage has been extended to include patents issuing through June 30, 1975. In addition, at the end of each of these reports a "bibliography" is given which lists all patents specifically referred to in the body of the report.

HIGH FOREIGN SHARE -- ELECTRICAL/MECHANICAL TECHNOLOGIES

TECHNOLOGY	AVERAGE* % FOREIGN	PAGE
Special stitch knitting machines	100.0%	36
Mineral winning machines	95.2%	68
Electrically controlled clockwork movements	94.4%	21
Calendar watches	92.7%	22
Safety release ski bindings	83.7%	69
Machines for liquid treatment of textile material	82.8%	39
Production of flat glass	80.6%	65
Fiber strand false twisting devices	79.4%	38
Linear electric propulsion systems for "tracked" vehicles	78.7%	17
Slack adjuster for drum-type brakes	77.8%	18
Continuous bobbin and cop winding	77.6%	37
Electron microscopes	76.5%	31
Car mounted ballast tamper	72.3%	19
Tuning fork drive clockwork movements	71.6%	20
Circuit breakers with arc extinguisher	71.1%	28

* For Fiscal Years 1972-1974 (i.e., 7/1/71 - 6/30/74)

HIGH FOREIGN SHARE -- CHEMICAL TECHNOLOGIES

TECHNOLOGY	AVERAGE* % FOREIGN	PAGE
Cyclopentanohydrophenanthrene containing glycosides	96.3%	52
2-Substituted oxazoles and oxazolidines	78.1%	48
Dyeing of skins, hair, fur or feathers	76.2%	59
Color picture production	75.7%	42
Production of nickel or cobalt metal	72.7%	61
Preparation, recovery and purification of lactams	71.2%	57
Certain compounds containing an intercyclic acyclic methine linkage	71.0%	46
Heterocyclic nitrogen compounds	68.9%	49
Unsaturated acids from unsaturated aldehydes	67.5%	54
Subtractive methods for producing color pictures	67.0%	43
Fermentates of unknown structure	66.2%	53
Distillation in the presence of inhibitors or stabilizers	65.3%	58
Processes for making portland type cements	64.8%	60
6-Oxychromans	63.9%	51

* For Fiscal Years 1972-1974 (i.e., 7/1/71 - 6/30/75)

HIGH OVERALL GROWTH -- ELECTRICAL/MECHANICAL TECHNOLOGIES

TECHNOLOGY	AVERAGE* % GROWTH	PAGE
Shift registers utilizing FET'S	62.2%	34
Control of oil spillages in bodies of water	50.8%	66
Integrating converters	48.4%	32
Cardiac pacemakers	40.4%	63
Intelligence comparison	38.0%	26
Gas lasers**	36.0%	85
Machine readable encoded records	35.3%	25
Machines for harvesting trees	33.1%	67
Optical fiber waveguide	32.1%	23
Delta modulation systems	30.5%	35
Microfilm display devices for information retrieval	28.6%	24
Linear electric propulsion systems for "tracked" vehicles	27.5%	17
Triac control devices	26.2%	33
Electric photocopying machines	25.6%	45
Fluid collectors for diagnostics	24.8%	64

* For Fiscal Years 1972-1974 (i.e., 7/1/71 - 6/30/74)

** "Examiner Report" Statistical coverage extended to include Fiscal Year 1975 (i.e., through 6/30/75)

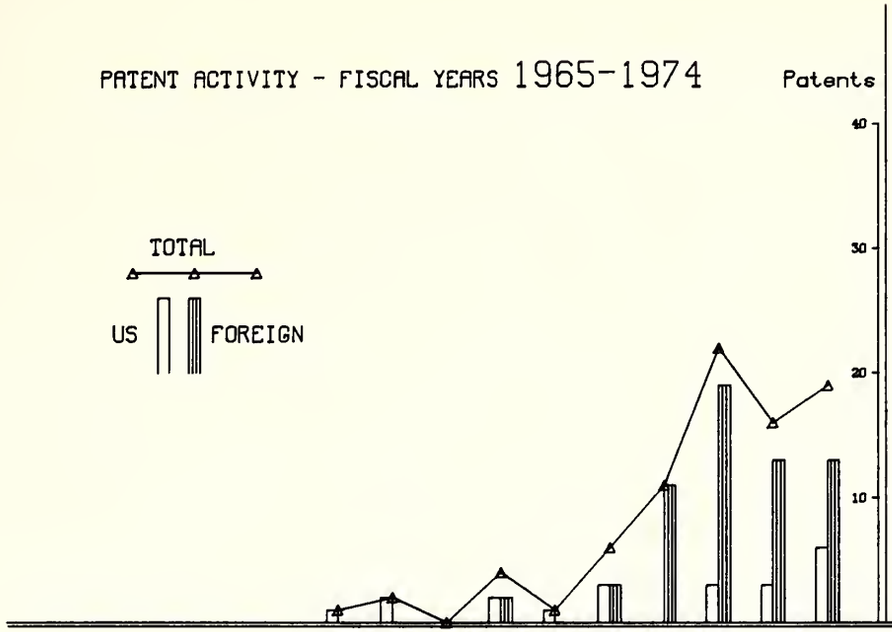
HIGH OVERALL GROWTH -- CHEMICAL TECHNOLOGIES

TECHNOLOGY	AVERAGE* % GROWTH	PAGE
Prostaglandins**	83.5%	71
Electrolytic analyzing or testing apparatus	43.0%	30
Physical development of certain exposed light sensitive elements	38.1%	41
Substantially pure carbon products	29.6%	62
Dyeing of polyester blends	26.5%	40
Cepham or cephem ring containing compounds	26.5%	50
Color electrophotography**	25.2%	79
Synthetic resinous block copolymers	25.2%	56
Processes for preparing esters from olefins	25.1%	55
Heterocyclic stilbenes and styrenes	22.7%	47
Electrophotographic media	22.5%	44
Preparation of semiconductors	21.9%	29
Primary gas batteries	20.0%	27

* For Fiscal Years 1972-1974 (i.e., 7/1/71 - 6/30/74)

** "Examiner Report" Statistical coverage extended to include Fiscal Year 1975 (i.e., through 6/30/75)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	2		4	1	6	11	22	16	19	82
UNITED STATES	1	2		2	1	3		3	3	6	21
TOTAL FOREIGN				2		3	11	19	13	13	61
UNITED KINGDOM				2		2	5	9	1	3	22
FRANCE						1	1	6	6	5	19
JAPAN							2	1	3	2	8
GERMANY								1	3	3	7
U.S.S.R.							2	1			3
ALL OTHER (2)							1	1			2

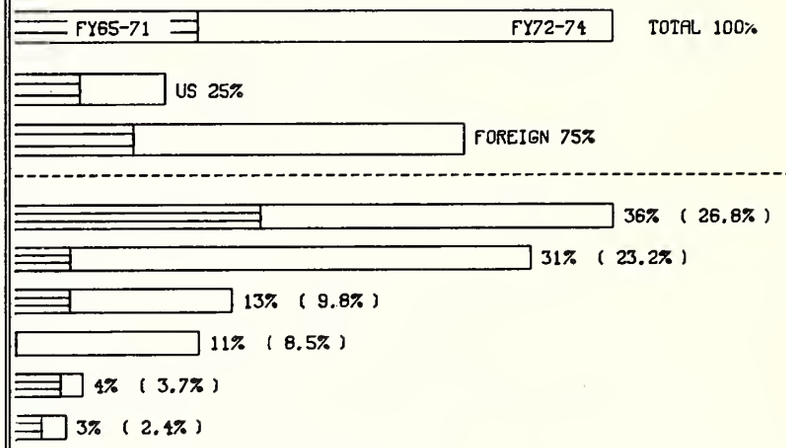
LINEAR ELECTRIC PROPULSION SYSTEMS FOR "TRACKED" VEHICLES

Linear induction motor systems for propelling vehicles on a fixed roadway (e.g., rapid-rail transit propulsion systems). Included are linear motors with the primary or secondary mounted either on the vehicle or the roadway. Also included are linear motors which provide levitation (e.g., magnetic suspension) and/or propulsion to the vehicle. Particularly active are superconductor coils used as the primary winding. (Class 104, subclass 148LM)

FY72-74 Activity Indices

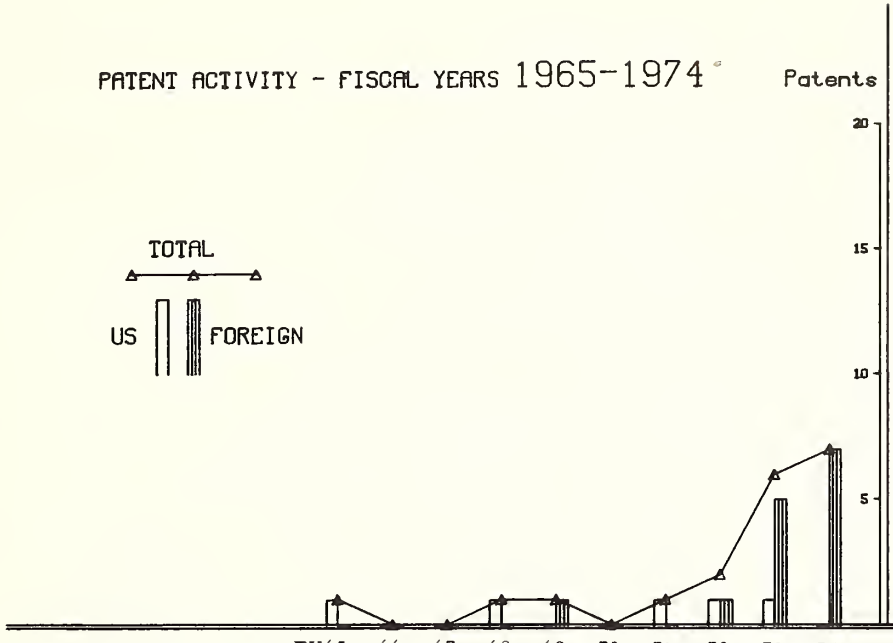
Average % Foreign 79.0% Average % Growth 27.5%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



SLACK ADJUSTER FOR DRUM-TYPE BRAKES

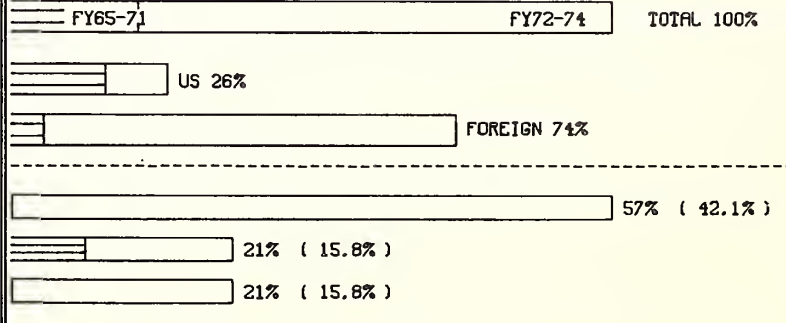
Automobile drum-type brake assembly devices fitted with automatic wear compensation adjustment mechanisms which include a mechanical connection to a parking brake actuator. Due to this arrangement, the drum-type brake is adjusted upon each actuation of the parking brake. (Class 188, subclass 79.5P)

FY72-74 Activity Indices

Average % Foreign 77.8% Average % Growth 5.3%

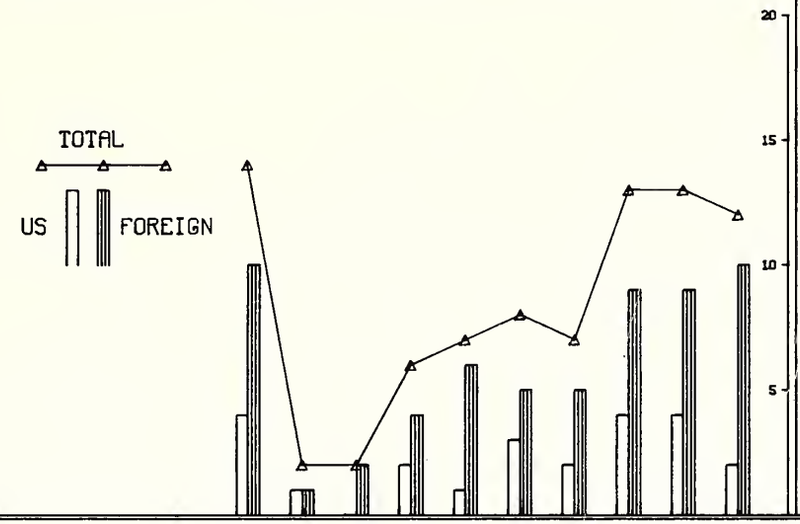
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1			1	1		1	2	6	7	19
UNITED STATES	1			1			1	1	1		5
TOTAL FOREIGN					1			1	5	7	14
UNITED KINGDOM								1	1	6	8
GERMANY					1				1	1	3
JAPAN									3		3

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



CAR MOUNTED BALLAST TAMPER

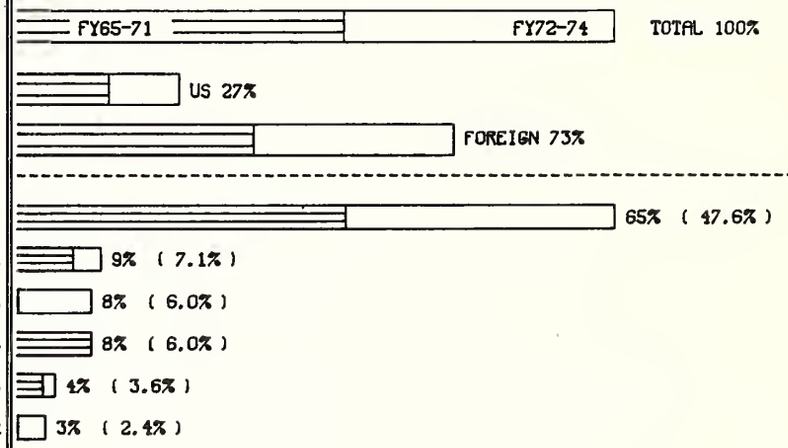
Leveling railroad track and tamping track ballast by use of apparatus mounted on railroad cars. Included are mobile track working machines having fixed and movable tamping heads which advance from operating station to operating station in a synchronized tamping cycle. Also included are devices for controlling the degree of ballast compaction, geometric positioning of tracks and overall synchronization of all operating stations. Particularly active are machines which combine track ballast tamping, track lifting and leveling, and track alignment operations. (Class 104, subclass 12)

FY72-74 Activity Indices

Average % Foreign 72.3% Average % Growth 7.0%

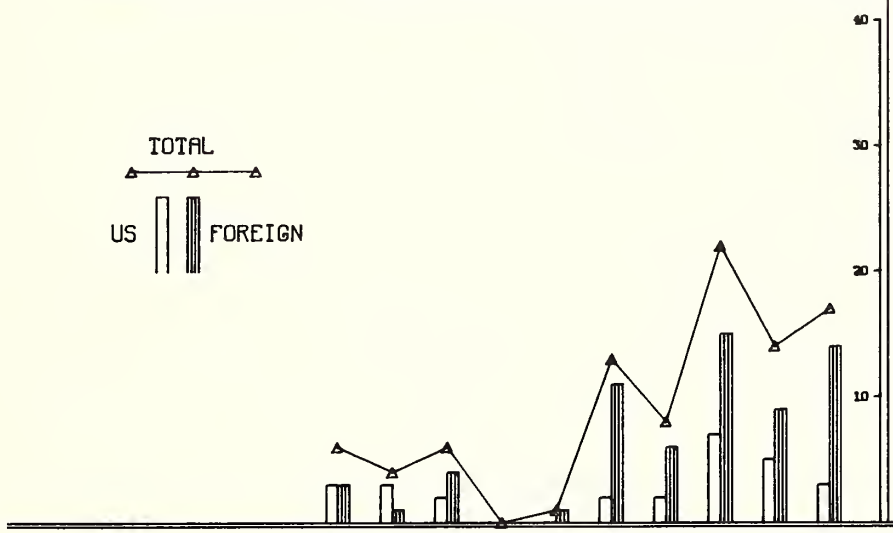
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	14	2	2	6	7	8	7	13	13	12	84
UNITED STATES	4	1		2	1	3	2	4	4	2	23
TOTAL FOREIGN	10	1	2	4	6	5	5	9	9	10	61
AUSTRIA	6	1		3	4	3	5	5	8	5	40
SWITZERLAND	2		1			1		1		1	6
GERMANY								2	1	2	5
CANADA	2		1	1	1						5
AUSTRALIA					1	1				1	3
ALL OTHER (2)								1		1	2

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	6	4	6		1	13	8	22	14	17	91
UNITED STATES	3	3	2			2	2	7	5	3	27
TOTAL FOREIGN	3	1	4		1	11	6	15	9	14	64
JAPAN	2	1	2			3	1	4	3	8	24
SWITZERLAND	1		2			2	3	5	3	4	20
GERMANY					1	4	1	4	2	2	14
UNITED KINGDOM						2		1	1		4
ALL OTHER (2)							1	1			2

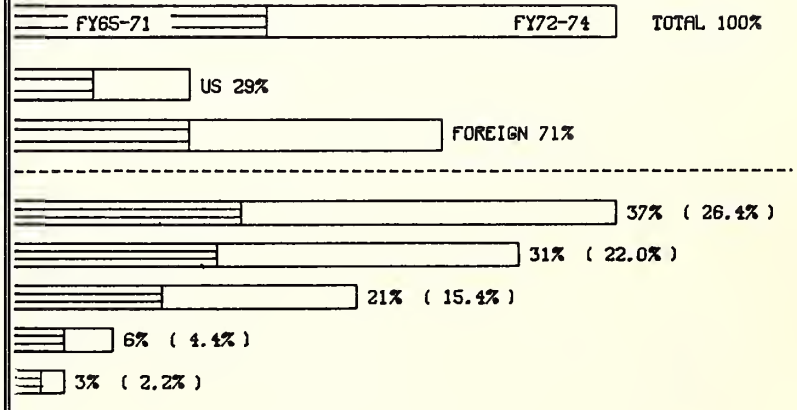
TUNING FORK DRIVE CLOCKWORK MOVEMENTS

Electrically controlled or operated clockwork movements having a tuning fork vibrating at an audio frequency standard. Included are mechanisms for converting the vibratory movements of the tuning fork into the rotary movements of a clock hand gear train. Particularly active are efforts to obtain amplitude stabilization using circuits which compensate for variations due to changes in battery voltage, environmental changes and other mechanical disturbances. Component miniaturization is also active. (Class 58, subclass 23TF)

FY72-74 Activity Indices

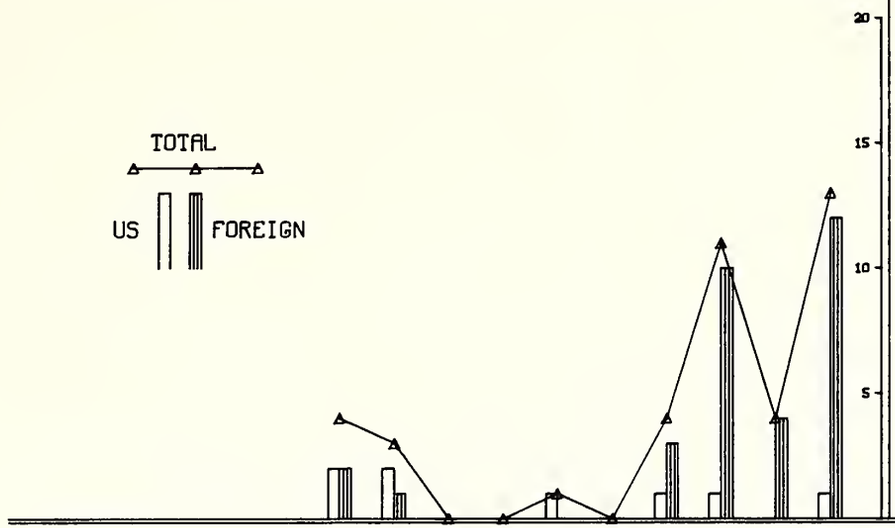
Average % Foreign 71.6% Average % Growth 18.6%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	4	3			1		4	11	4	13	40
UNITED STATES	2	2			1		1	1		1	8
TOTAL FOREIGN	2	1					3	10	4	12	32
JAPAN								3	3	9	15
GERMANY							3	3		3	9
SWITZERLAND	2	1						2			5
FRANCE								1	1		2
UNITED KINGDOM								1			1

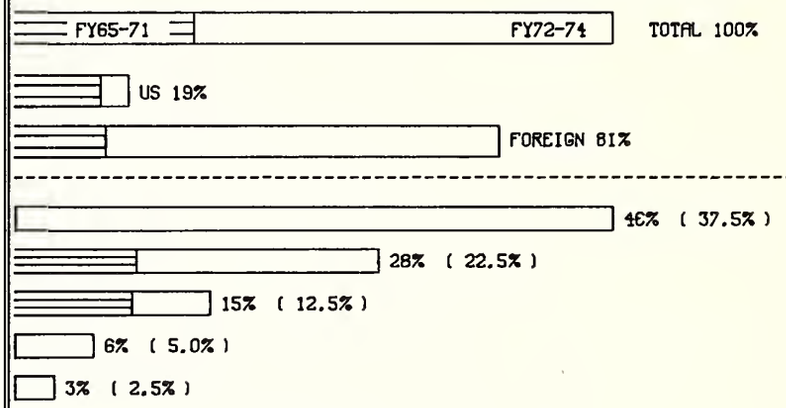
ELECTRICALLY CONTROLLED CLOCKWORK MOVEMENTS

Electrically controlled or operated clockwork movements employing a balance that is the rotor of the motor. Included are balance wheels formed with a pair of spaced discs mounting permanent magnets aligned in facing relation. Particularly active are electronic circuit arrangements for synchronizing the frequency of the balance with that of a relatively high frequency time standard (e.g., crystal oscillator, transistorized circuit). Also active are variations in arrangement of the coil, magnets and counterweights for reducing isochronal error of the balance. (Class 58, subclass 28A)

FY72-74 Activity Indices

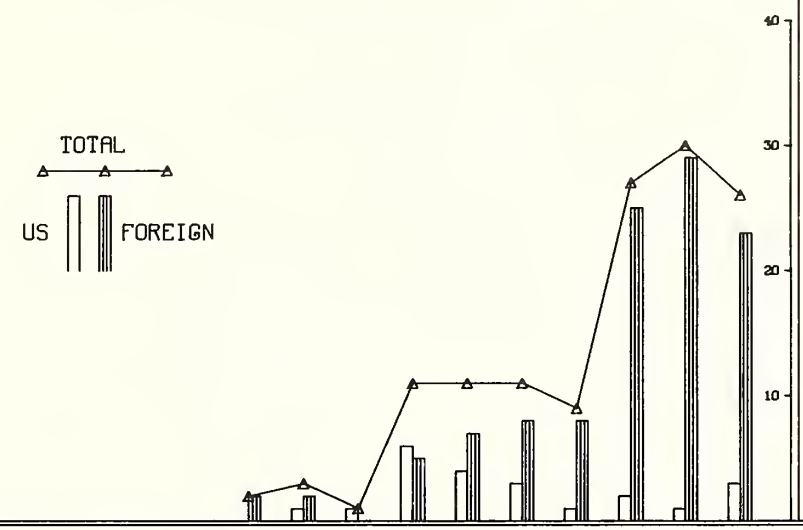
Average % Foreign 94.4% Average % Growth 8.1%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



CALENDAR WATCHES

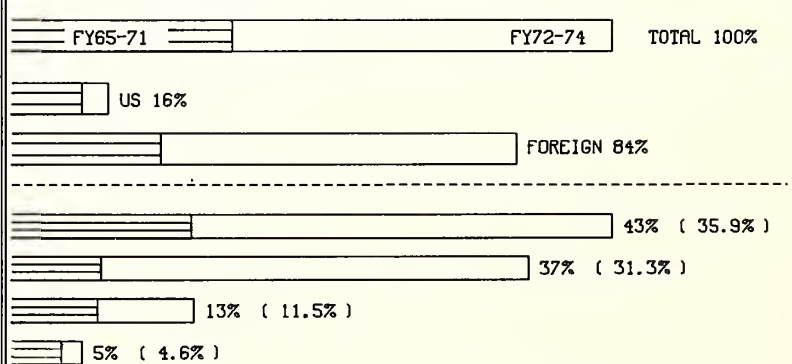
Timepieces which indicate the time of day, day of the week and the date of the month. Particularly active are techniques to simplify the manual changing of day and/or date (e.g., for months with less than 31 days). (Class 58, subclasses 5, 58)

FY72-74 Activity Indices

Average % Foreign 92.7% Average % Growth 27.5%

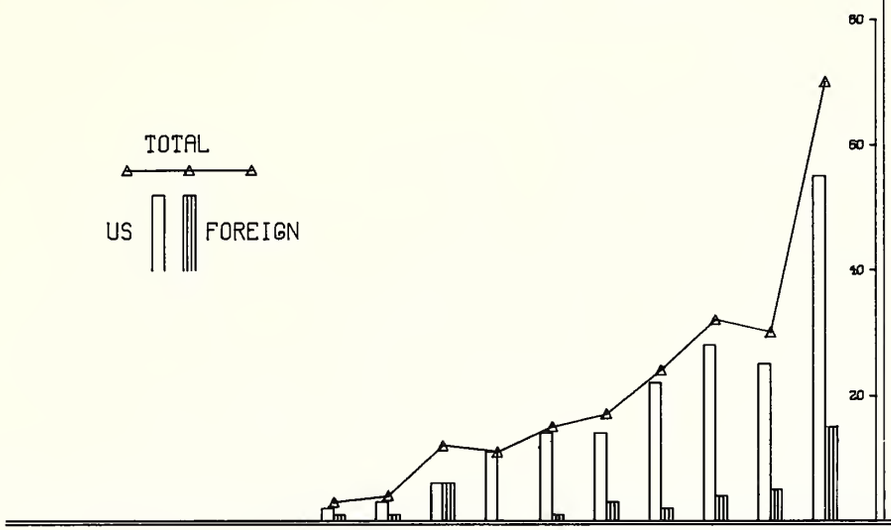
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	3	1	11	11	11	9	27	30	26	131
UNITED STATES		1	1	6	4	3	1	2	1	3	22
TOTAL FOREIGN	2	2		5	7	8	8	25	29	23	109
SWITZERLAND	2	1		3	5	1	2	9	14	10	47
JAPAN				1	2	4		13	12	9	41
GERMANY		1		1			5	2	3	3	15
ALL OTHER (5)						3	1	1		1	6

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



OPTICAL FIBER WAVEGUIDE

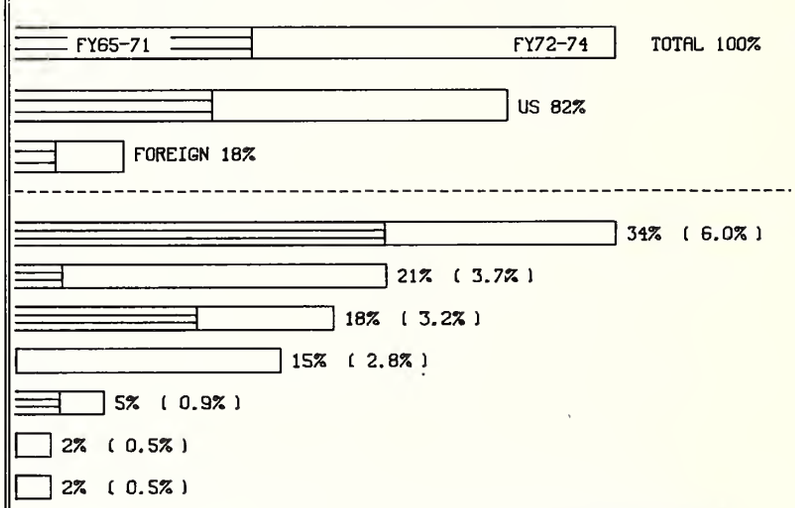
Optical fiber waveguide devices which are applicable to the field of communication systems (e.g., picturephones, CATV, computers). Included are optical fibers suitable for transmitting, within the confines of their outer surface, electromagnetic radiation within the visible spectrum and adjoining portions of the infrared and ultraviolet spectra. Particularly active are optical fibers capable of low-loss energy transmission and optical connectors and couplers for use between the fiber waveguides. (Class 350, subclass 96WG)

FY72-74 Activity Indices

Average % Foreign 18.2% Average % Growth 32.1%

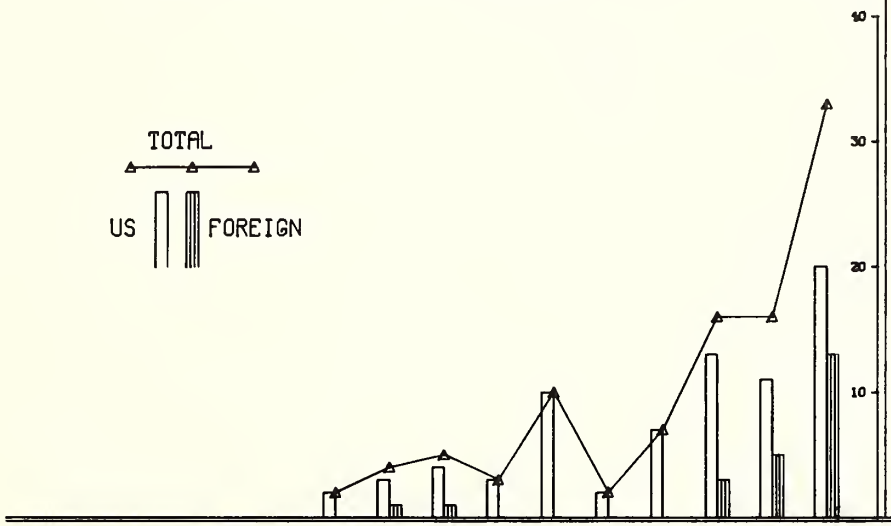
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	4	12	11	15	17	24	32	30	70	218
UNITED STATES	2	3	6	11	14	14	22	28	25	55	180
TOTAL FOREIGN	1	1	6		1	3	2	4	5	15	38
UNITED KINGDOM	1	1	3			1	2		1	4	13
JAPAN			1					3	1	3	8
FRANCE			2		1	1			1	2	7
GERMANY								1	1	4	6
NETHERLANDS						1				1	2
ITALY									1		1
CANADA										1	1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	4	5	3	10	2	7	16	16	33	98
UNITED STATES	2	3	4	3	10	2	7	13	11	20	75
TOTAL FOREIGN		1	1					3	5	13	23
JAPAN								1	2	7	10
GERMANY								2	3	3	8
SWITZERLAND		1								1	2
FRANCE										1	1
CANADA										1	1
GREECE			1								1

MICROFILM DISPLAY DEVICES FOR INFORMATION RETRIEVAL

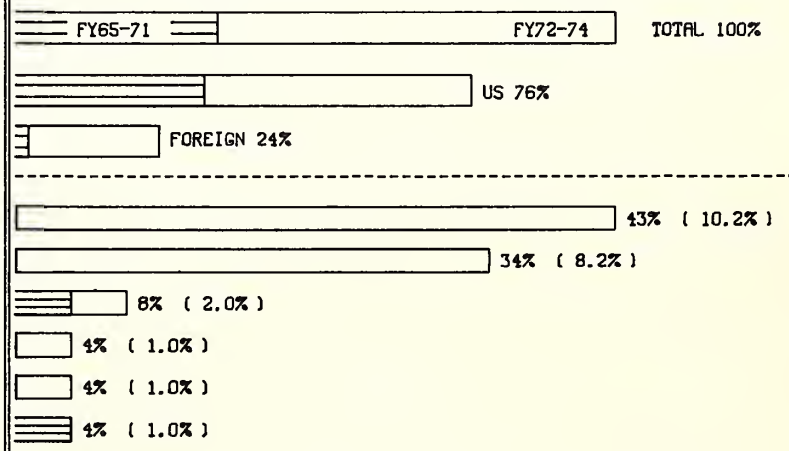
Devices for selecting and visually displaying information stored in individual rectangular sheets of microfilm (e.g., microfiche). The information is selectively displayed by positioning the appropriate area of the microfilm sheet and the optical path relative to one another while selectively blocking light from going through undesired data. Techniques to achieve keyboard controlled, automatic operation have been particularly active. (Class 353, subclass 27)

FY72-74 Activity Indices

Average % Foreign 32.3%

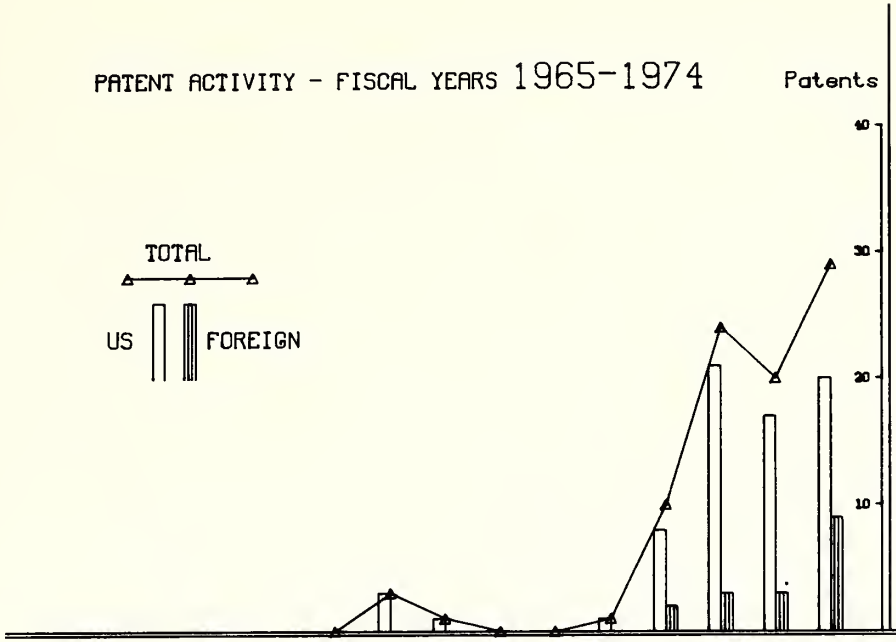
Average % Growth 28.6%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS		3	1			1	10	24	20	29	88
UNITED STATES		3	1			1	8	21	17	20	71
TOTAL FOREIGN							2	3	3	9	17
UNITED KINGDOM								1	1	3	5
SWITZERLAND								1		3	4
FRANCE									2	1	3
NETHERLANDS							2				2
SWEDEN										1	1
AUSTRALIA										1	1
GERMANY								1			1

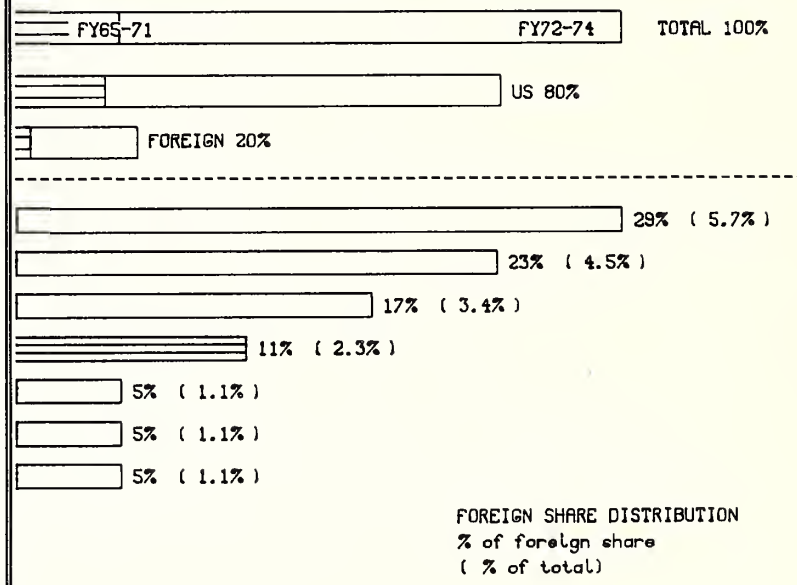
MACHINE READABLE ENCODED RECORDS

Encoded records carrying data which can automatically be read by scanning machines (e.g., optical, magnetic). Encoded records may take any form, (e.g., credit card, document, merchandise, package, mail.) Record coding media development is particularly active, with effort being focused on light transmitting fibers, binary code bars and fluorescent ink. Also included are methods for encoding the data on the record medium. (Class 235, subclass 61.12N)

FY72-74 Activity Indices

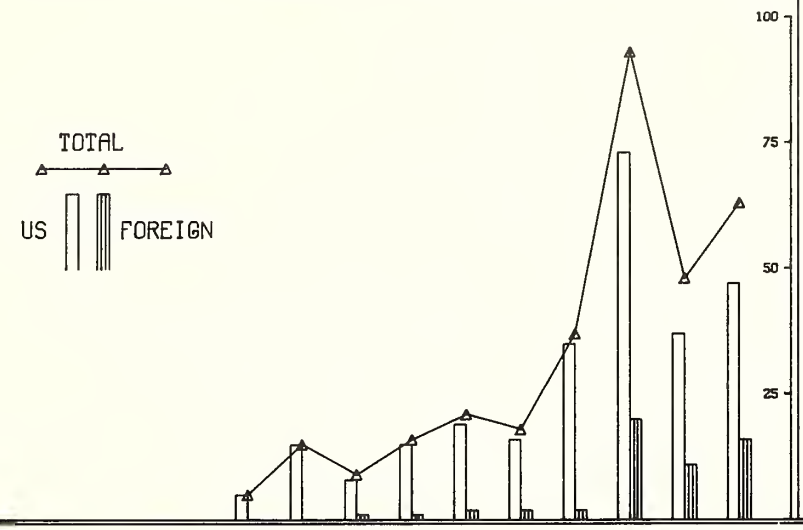
Average % Foreign 21.0% Average % Growth 35.3%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



INTELLIGENCE COMPARISON

Apparatus and systems which compare and verify a coded card record. Included are coded card activated systems for (1) automatic banking (e.g., deposits, money dispensing, note payments, fund transferring); (2) credit card verification (e.g., ownership, desired vs. allowable credit); or (3) security access control. The apparatus include machines which automatically scan and read the coded card by optical or other type devices. (Class 235, subclass 61.7B; class 340, subclass 149A)

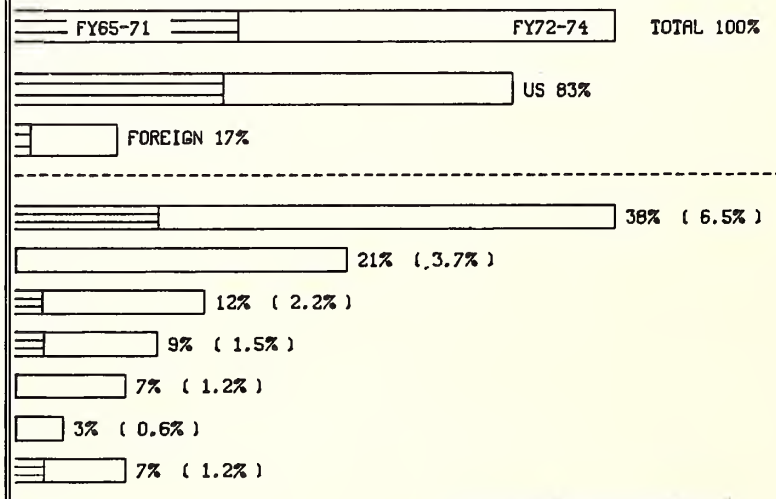
FY72-74 Activity Indices

Average % Foreign 23.0%

Average % Growth 38.0%

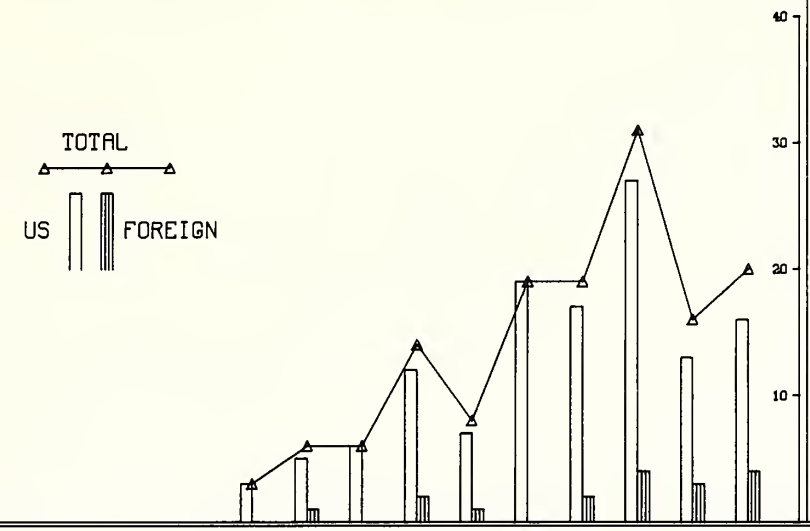
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	5	15	9	16	21	18	37	93	48	63	325
UNITED STATES	5	15	8	15	19	16	35	73	37	47	270
TOTAL FOREIGN			1	1	2	2	2	20	11	16	55
JAPAN					2	1	2	10	3	3	21
UNITED KINGDOM								4	2	6	12
SWEDEN				1				1	3	2	7
GERMANY						1		2	1	1	5
SWITZERLAND								2	1	1	4
CANADA								1		1	2
ALL OTHER (4)			1						1	2	4

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	6	6	14	8	19	19	31	16	20	142
UNITED STATES	3	5	6	12	7	19	17	27	13	16	125
TOTAL FOREIGN		1		2	1		2	4	3	4	17
JAPAN					1		1	1	1	1	5
UNITED KINGDOM								3		2	5
FRANCE									2		2
SWEDEN										1	1
GERMANY							1				1
SWITZERLAND				1							1
SPAIN		1									1
INDIA				1							1

PRIMARY GAS BATTERIES

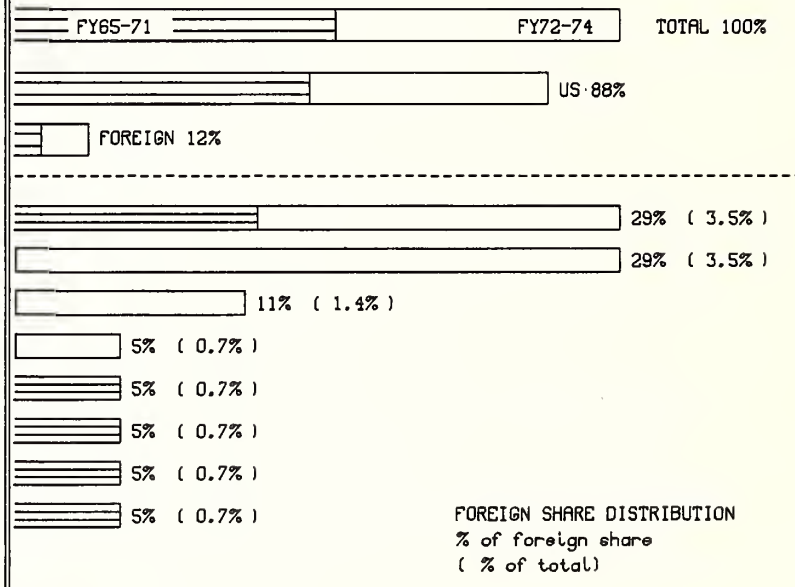
Primary gas batteries containing a consumable metal anode, associated elements, and methods of operation or preparation. The gas is either 1) fed into the batteries from an external source, 2) generated within the cell, or 3) occluded within the electrode material. Typical of the batteries found here is the alkaline air-depolarized zinc cell. In this cell a zinc anode and electrolyte is centered in a porous pot and surrounded by a porous carbon electrode. Atmospheric oxygen, moving through the porous carbon, is reduced and zinc is oxidized at the anode. (Class 136, subclass 86A)

FY72-74 Activity Indices

Average % Foreign 16.4%

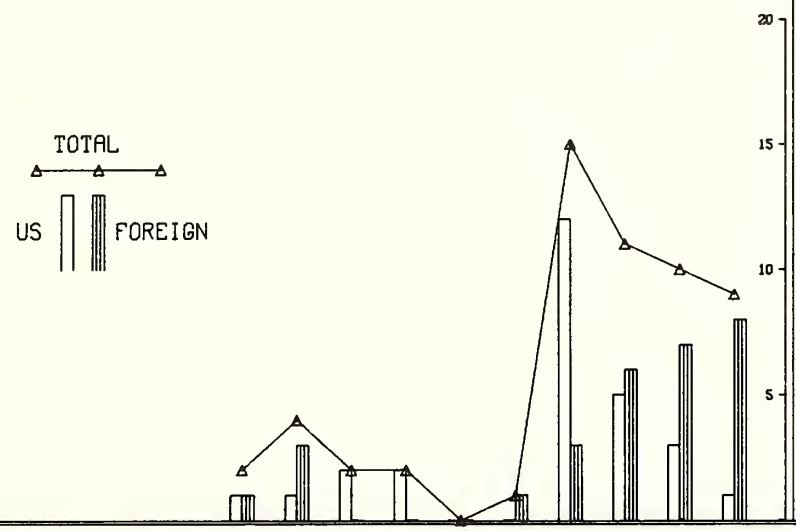
Average % Growth 20.0%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	4	2	2		1	15	11	10	9	56
UNITED STATES	1	1	2	2			12	5	3	1	27
TOTAL FOREIGN	1	3				1	3	6	7	8	29
FRANCE							2	2	3		7
GERMANY						1			2	3	6
ITALY								3	1	1	5
SWITZERLAND	1	2								2	5
JAPAN								1	1	2	4
SWEDEN		1									1
UNITED KINGDOM							1				1

CIRCUIT BREAKERS WITH ARC EXTINGUISHER

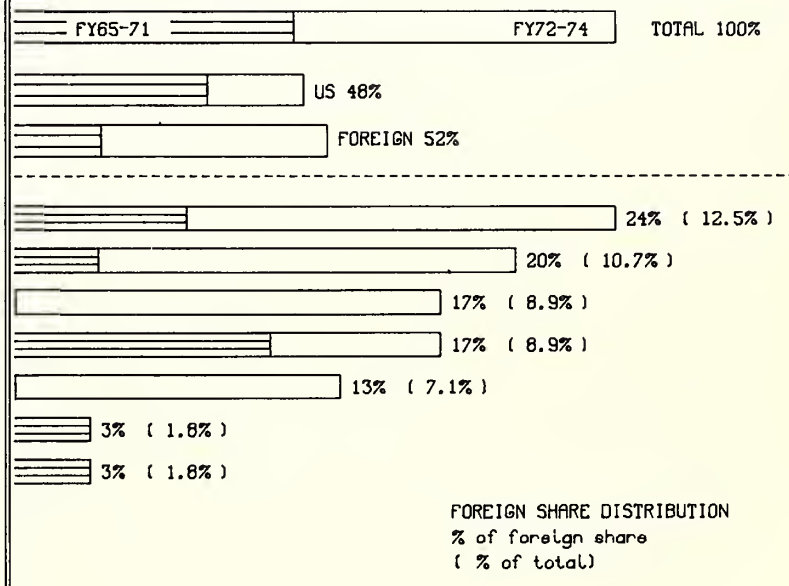
Arc suppressing devices (e.g., puffer-pistons) which produce and/or direct a blast of pressurized air or gas against an electric arc caused by opening the contacts of a high voltage circuit breaker. Included are breaker contacts which are enclosed in a housing generally filled with an insulating and arc extinguishing gas (e.g., sulfur hexafluoride). When the electric circuit is broken and the breaker contacts open, the puffer-piston is triggered into a compression stroke to direct pressurized gas or air against the arc. Particularly active are nozzles and operating mechanisms for concentrating the blast, and dual puffer-piston arrangements. (Class 200, subclass 148A)

FY72-74 Activity Indices

Average % Foreign 71.1%

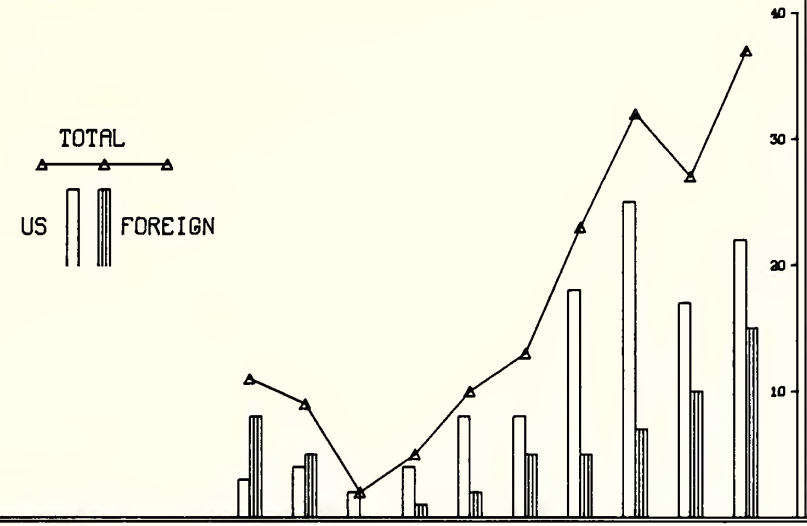
Average % Growth 8.4%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



PREPARATION OF SEMICONDUCTORS

Processes for making essentially homogeneous electrically semiconductive material which include the step of adding a P- or N- type impurity to the material during growth. The semiconductive material, (1) has at least two contiguous layers differing in the number of unbound electrons and/or differing in energy gap levels, and (2) exhibits a junction between the contiguous layers. Included are processes which utilize a seed crystal for drawing barrier layer material from a melt. Recent work involves methods for preparing groups III and V multilayer semiconductors, such as GaAlAs or GaAlP. These emanate light rays in the visible range and are useful as photoswitching elements for display, memory control or computation operations. (Class 148, subclasses 171, 172)

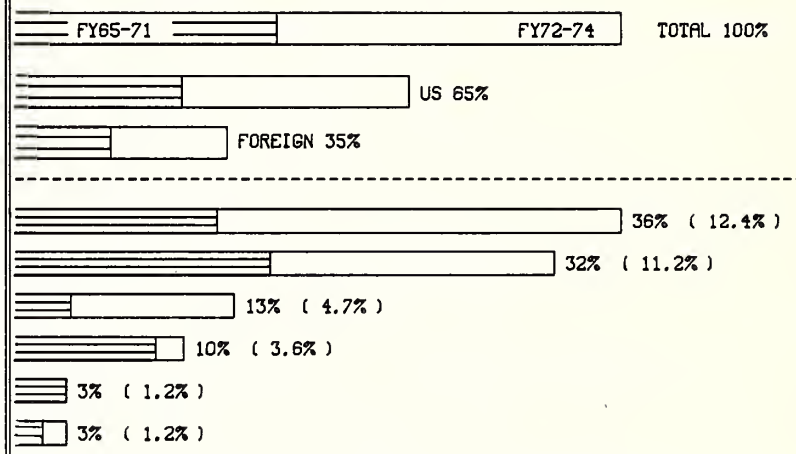
FY72-74 Activity Indices

Average % Foreign 33.3%

Average % Growth 21.9%

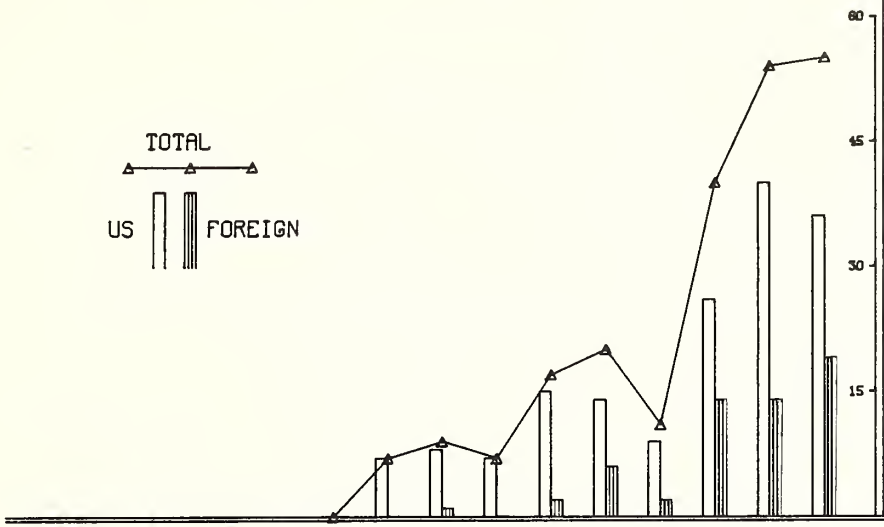
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	11	9	2	5	10	13	23	32	27	37	169
UNITED STATES	3	4	2	4	8	8	18	25	17	22	111
TOTAL FOREIGN	8	5		1	2	5	5	7	10	15	58
JAPAN	2	2				1	2	3	4	7	21
GERMANY	4	2			1	1	1	2	4	4	19
FRANCE		1				1		1	2	3	8
UNITED KINGDOM	2				1	2		1			6
NETHERLANDS				1			1				2
ALL OTHER (2)							1			1	2

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



ELECTROLYTIC ANALYZING OR TESTING APPARATUS

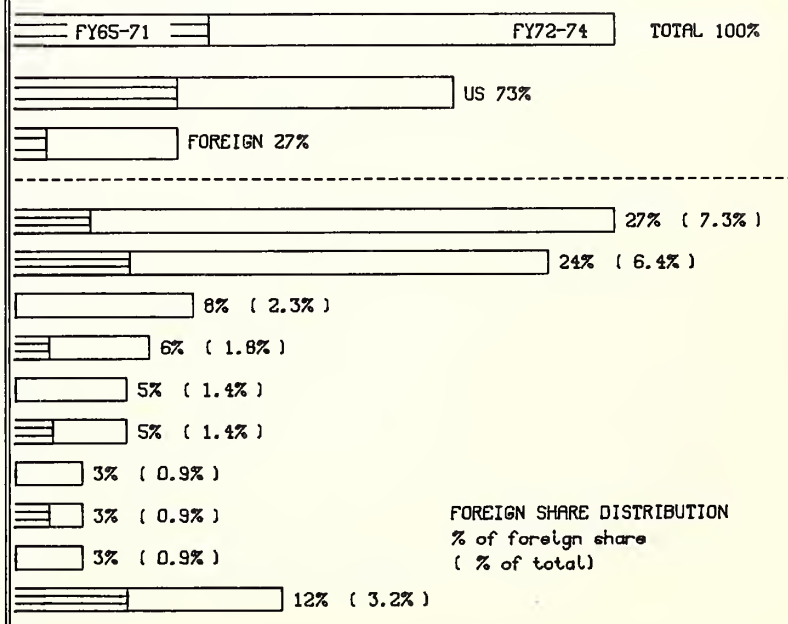
Apparatus, utilizing electrolytic action for analysis or testing, which employ: (1) non-glass ion sensitive membrane electrodes, especially useful for pH and metal detection; (2) a selectively permeable membrane cell, generally useful for gas detection; or, (3) a solid electrolyte sensor, predominantly used as an oxygen sensor. (Class 204, subclasses 195M, 195P, 195S)

FY72-74 Activity Indices

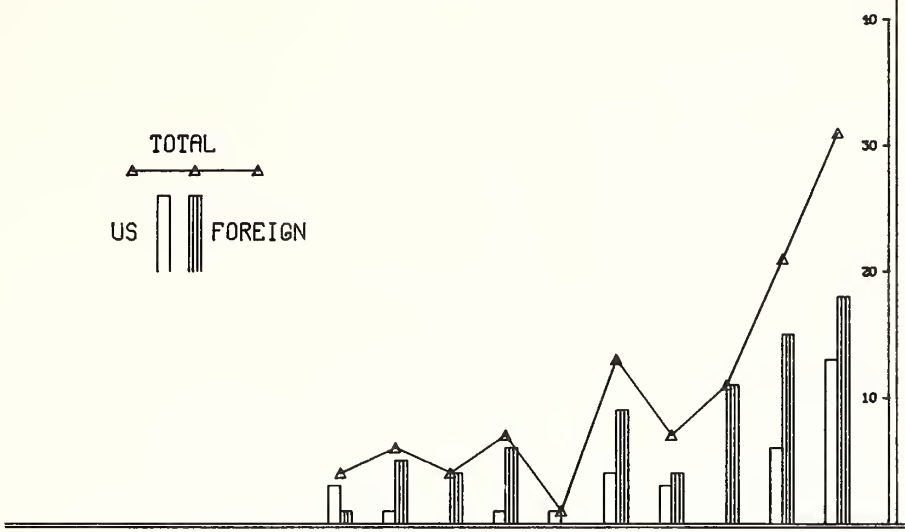
Average % Foreign 31.5% Average % Growth 43.0%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS		7	9	7	17	20	11	40	54	55	220
UNITED STATES		7	8	7	15	14	9	26	40	36	162
TOTAL FOREIGN			1		2	6	2	14	14	19	58
JAPAN					1		1	3	1	10	16
UNITED KINGDOM			1		1	1		3	8		14
NETHERLANDS								2	1	2	5
SWITZERLAND							1	1		2	4
CANADA										3	3
FRANCE						1		1		1	3
ISRAEL									1	1	2
GERMANY						1		1			2
USSR								1	1		2
ALL OTHER (6)						3		2	2		7

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	4	6	4	7	1	13	7	11	21	31	105
UNITED STATES	3	1		1	1	4	3		6	13	32
TOTAL FOREIGN	1	5	4	6		9	4	11	15	18	73
JAPAN		4	2	3		1	1	4	5	9	29
GERMANY			2	1		6	1	3	2	5	20
UNITED KINGDOM	1					1	1	4	6	3	16
NETHERLANDS		1		1					1	1	4
SWITZERLAND				1		1					2
FRANCE							1		1		2

ELECTRON MICROSCOPES

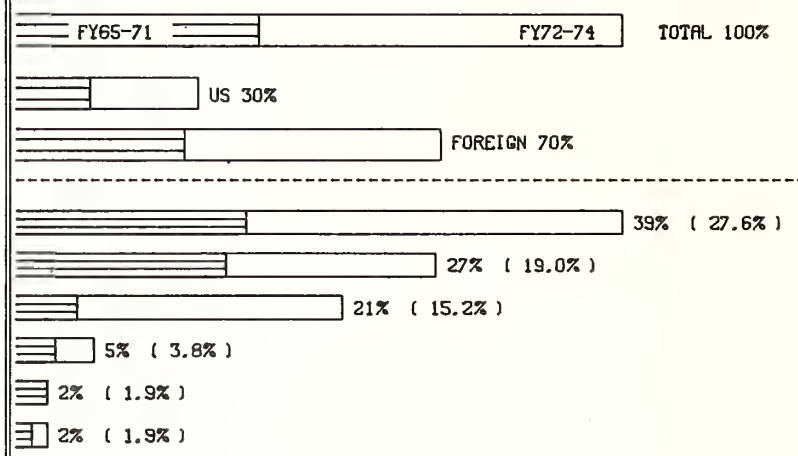
Devices and methods for analyzing a material by interacting it with an electron beam, which interaction produces a detectable variation in some parameter of the beam (e.g., its intensity, direction). These variations, which reflect some characteristic of the material, such as its density, composition or electrical potential, are then detected and presented in convenient form, for example, visually or by computer printout. (Class 250, subclass 311)

FY72-74 Activity Indices

Average % Foreign 76.5%

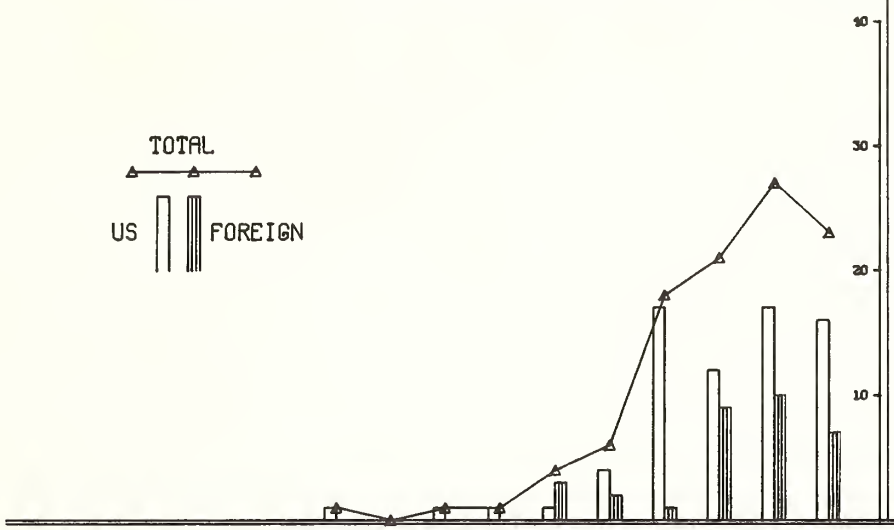
Average % Growth 14.3%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1		1	1	4	6	18	21	27	23	102
UNITED STATES	1		1	1	1	4	17	12	17	16	70
TOTAL FOREIGN					3	2	1	9	10	7	32
UNITED KINGDOM					3	1		3	5	3	15
FRANCE						1		2	3		6
GERMANY								1	1	3	5
JAPAN								3	1	1	5
NORWAY							1				1

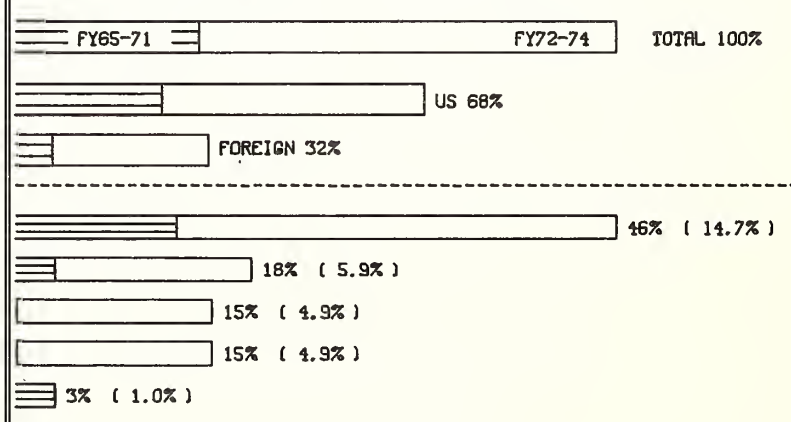
INTEGRATING CONVERTER

Analog to digital converters of the integrating type, including single as well as plural slope devices. The latter type includes dual slope converters, the predominant circuit used in digital voltmeters, and commonly used for such transducers as thermocouples. (Class 340, subclass 347NT)

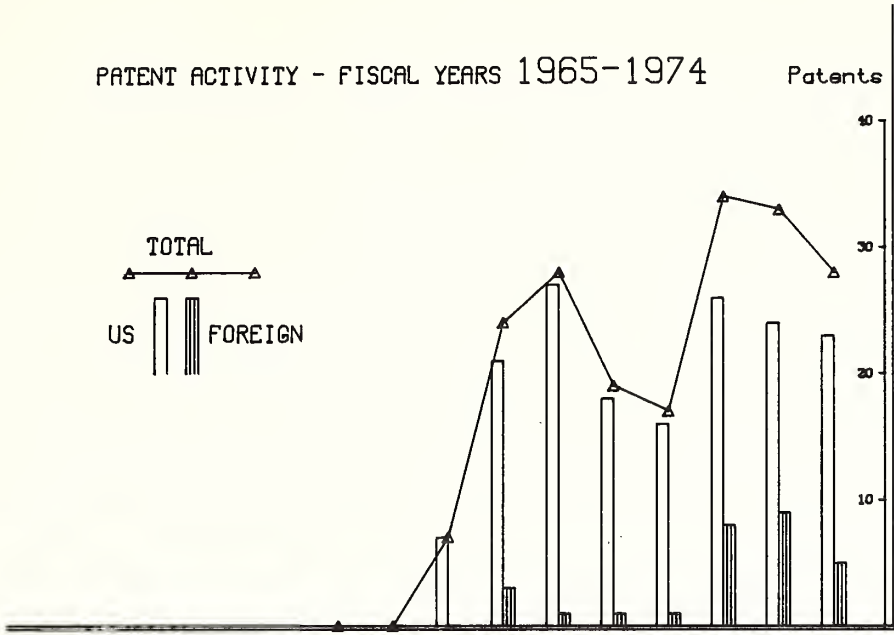
FY72-74 Activity Indices

Average % Foreign 36.6% Average % Growth 48.4%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)



TRIAC CONTROL DEVICES

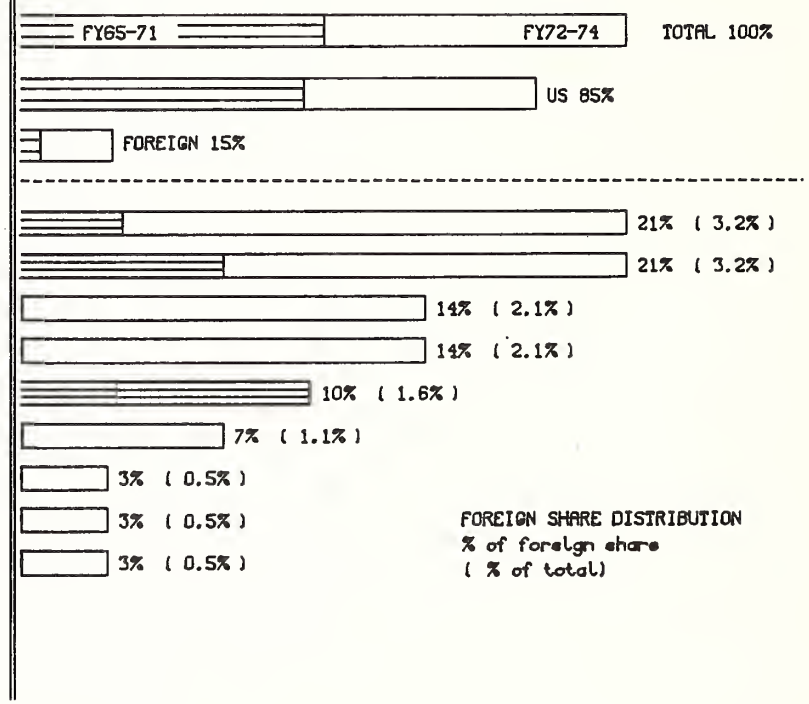
Semiconductor bi-directional switch apparatus which is triggered into conduction by a gate signal in a manner similar to the action of an SCR (silicon controlled rectifier). Generically known as TRIAC, the device is used in miscellaneous circuits having AC power responsive loads (e.g., motor starters and speed controls, lamp and resistance heater controls, temperature and/or humidity controls). (Class 307, subclass 252B)

FY72-74 Activity Indices

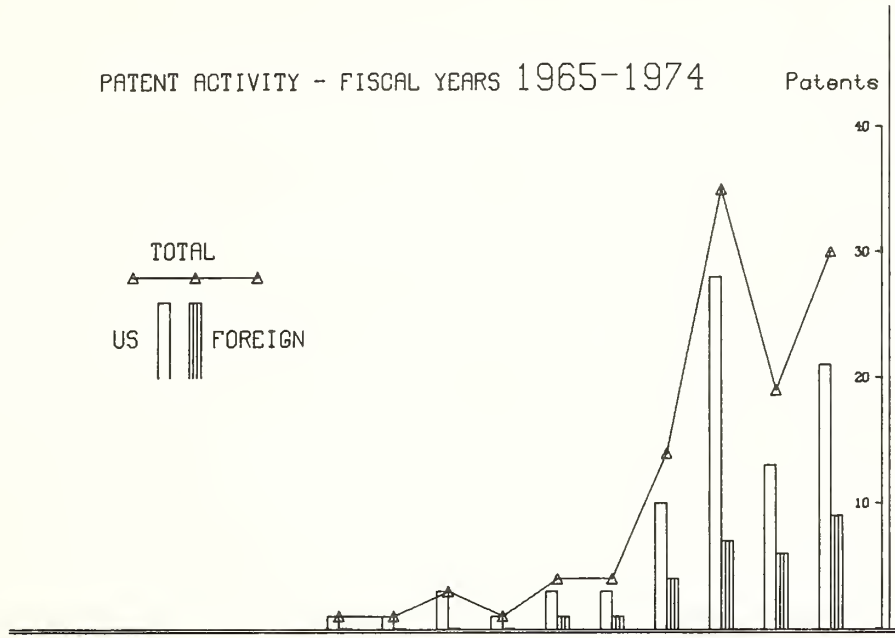
Average % Foreign 23.2%

Average % Growth 26.2%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS			7	24	28	19	17	34	33	28	190
UNITED STATES			7	21	27	18	16	26	24	23	162
TOTAL FOREIGN				3	1	1	1	8	9	5	28
JAPAN							1	2	1	2	6
UNITED KINGDOM					1	1			2	2	6
GERMANY								1	3		4
NETHERLANDS								3	1		4
FRANCE				3							3
SWITZERLAND								1		1	2
DENMARK								1			1
CANADA									1		1
BELGIUM									1		1



PATENT ACTIVITY - FISCAL YEARS 1965-1974



SHIFT REGISTERS UTILIZING FET'S

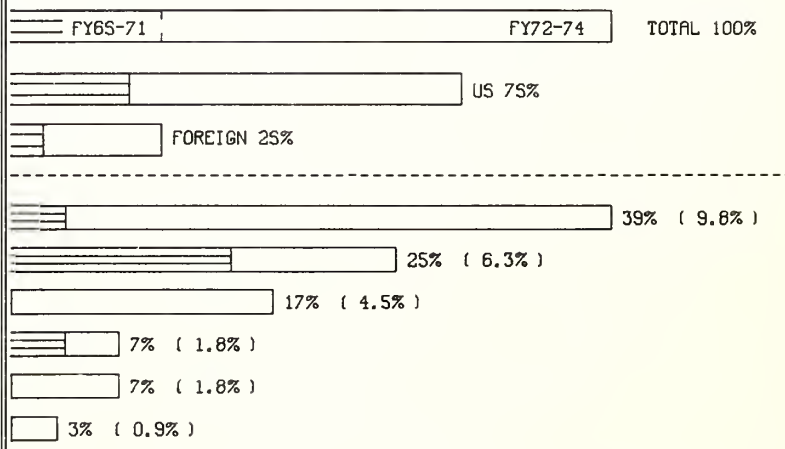
Shift registers employing miscellaneous non-linear field effect transistor (FET) devices as the active (e.g., switching) element in the register stages. Included are FET shift registers used for data storage and transfer. (Class 307, subclass 221C)

FY72-74 Activity Indices

Average % Foreign 26.2% Average % Growth 62.2%

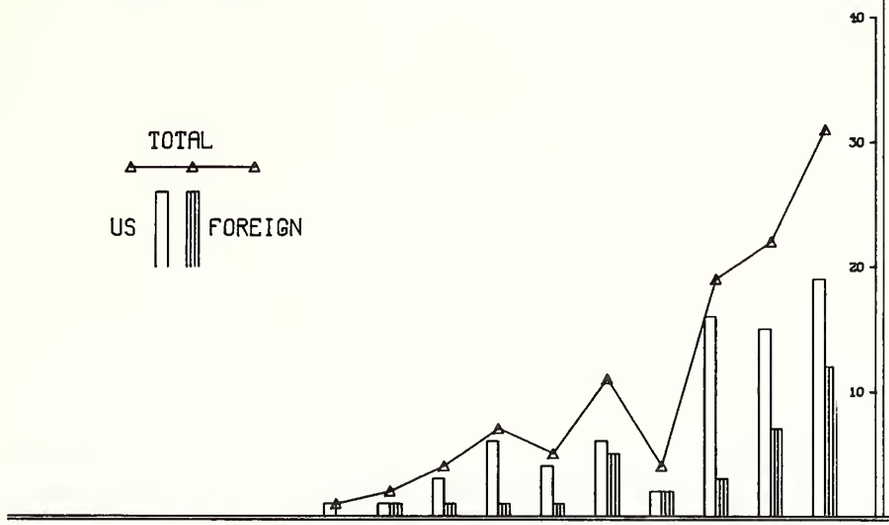
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	1	3	1	4	4	14	35	19	30	112
UNITED STATES	1	1	3	1	3	3	10	28	13	21	84
TOTAL FOREIGN					1	1	4	7	6	9	28
JAPAN							1	2	3	5	11
UNITED KINGDOM					1	1	2	3			7
NETHERLANDS								2		3	5
FRANCE							1		1		2
GERMANY									2		2
CANADA										1	1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



DELTA MODULATION SYSTEMS

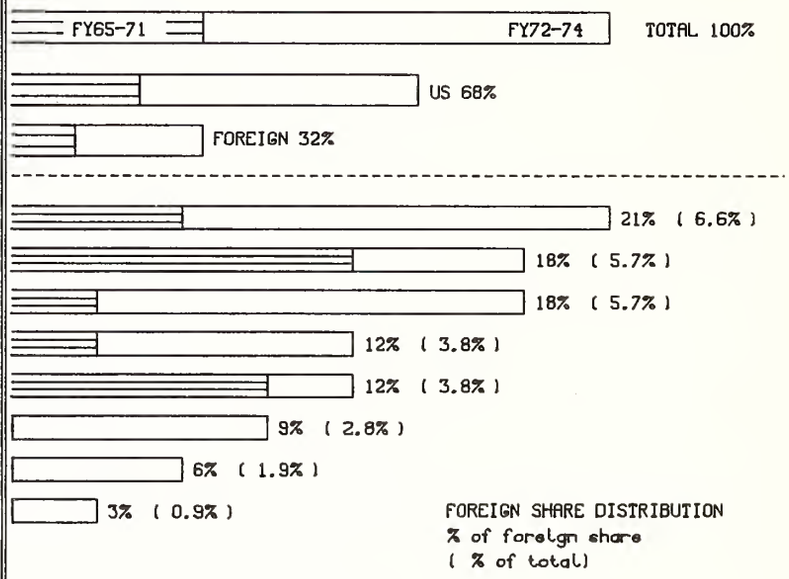
Delta modulated signal systems which are applicable to the field of communication where freedom from interference during transmission is desired (e.g. voice, conference circuits, video signals). Included are signal transmission systems which transmit an indication of how the signal is changing, the change being one of amplitude, signal slope, phase, or frequency. Particularly active are devices which compress the signal prior to encoding and expansion at the receiver. (Class 325, subclass 38B)

FY72-74 Activity Indices

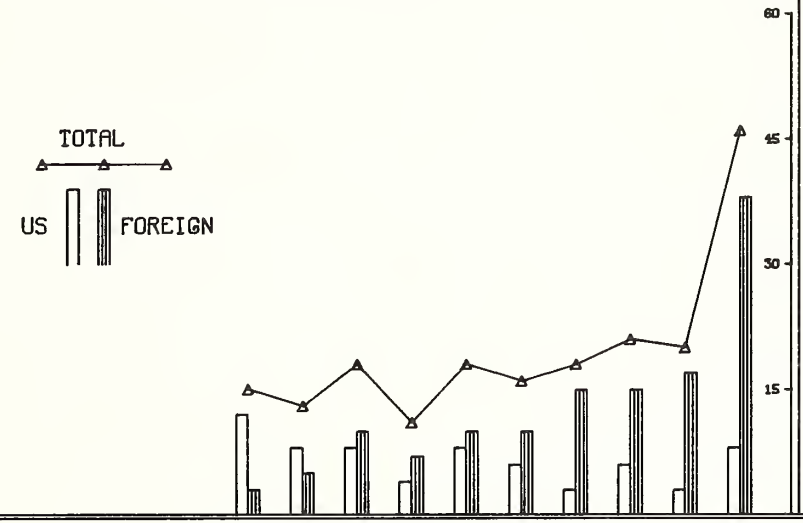
Average % Foreign 30.6% Average % Growth 30.5%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	2	4	7	5	11	4	19	22	31	106
UNITED STATES	1	1	3	6	4	6	2	16	15	19	73
TOTAL FOREIGN		1	1	1	1	5	2	3	7	12	33
JAPAN						2		1	2	2	7
UNITED KINGDOM						2	2	1		1	6
FRANCE				1						5	6
GERMANY					1				2	1	4
NETHERLANDS		1	1			1				1	4
CANADA									1	2	3
SWITZERLAND								1	1		2
SWEDEN									1		1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



SPECIAL STITCH KNITTING MACHINES

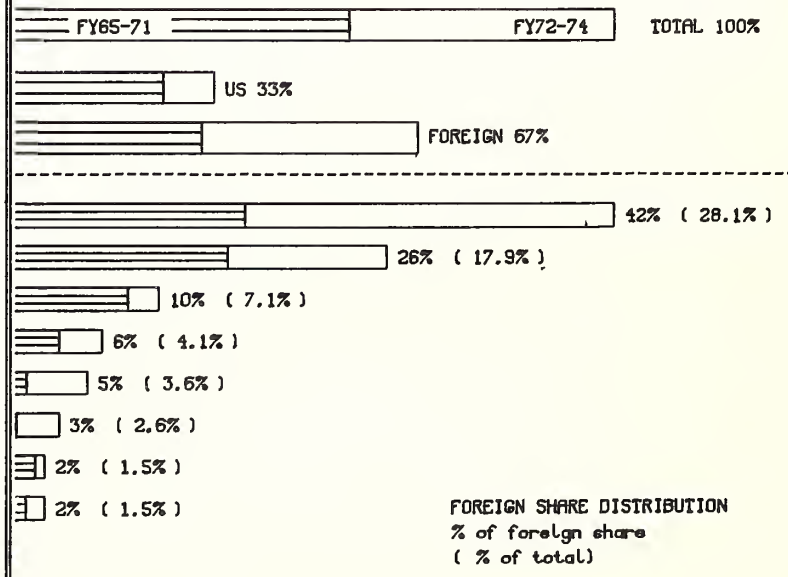
Knitting machines (e.g., circular or straight bed) with special stitch patterning devices which enable the needles to be selected under the control of a coded information carrier. Included are patterning devices incorporated on knitting machines which knit such fabrics as double-knit and hosiery. The devices, which can be operated by mechanical, electrical or pneumatic mechanisms, determine the stitch and/or color characteristics of the fabric. Particularly active are circular knitting machines with patterning devices adapted to operate at high speed and capable of infinite patterning. (Class 66, subclasses 50B, 50R, 75)

FY72-74 Activity Indices

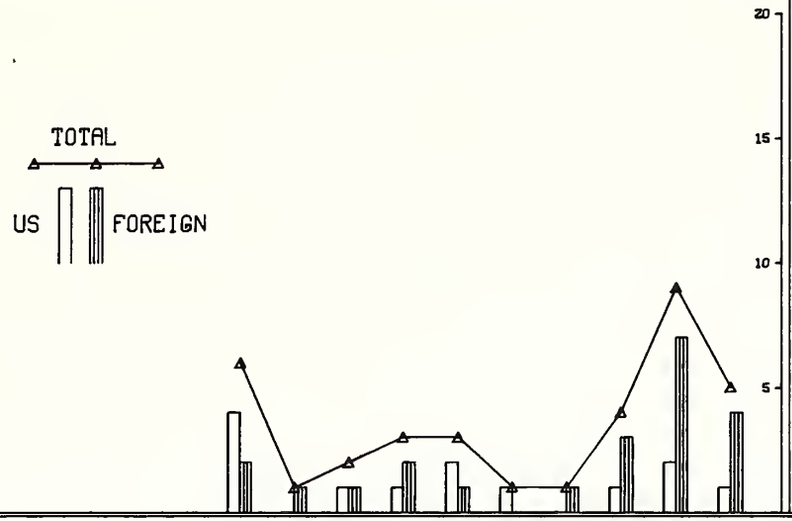
Average % Foreign 100.0% Average % Growth 5.2%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	15	13	18	11	18	16	18	21	20	46	196
UNITED STATES	12	8	8	4	8	6	3	6	3	8	66
TOTAL FOREIGN	3	5	10	7	10	10	15	15	17	38	130
GERMANY	2		5	4	3	2	5	7	8	19	55
UNITED KINGDOM	1	3	2	3	2	2	7	3	4	8	35
SWITZERLAND		1	3		1	4	2		1	2	14
ITALY		1			2	1		1	2	1	8
SPAIN							1	2	1	3	7
FRANCE								2	1	2	5
CZECHOSLOVAKIA					1	1				1	3
ALL OTHER (3)					1					2	3

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



CONTINUOUS BOBBIN AND COP WINDING

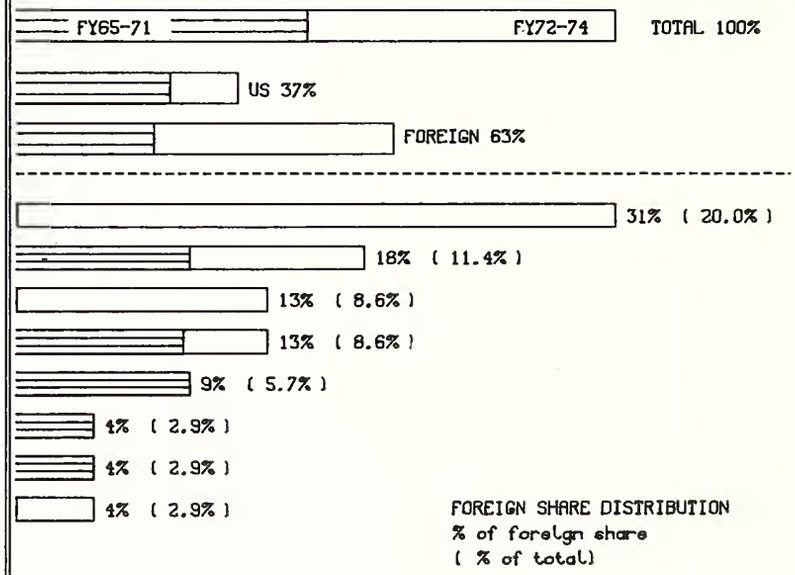
Continuous wire winding apparatus in which wire is automatically and cyclically wound at high speed onto alternate spools (e.g., bobbins, cops) for storage or in the manufacture of a commercial article. Included are mechanisms for (1) controlling tension of feed wire, (2) conveying and loading empty spools and unloading and removing full spools, (3) cyclically synchronizing the speed of a fully wound spool to that of the empty spool to be wound, (4) wire cutting and snagging, and (5) preventing injury from the whip action of loose ends of cut wire. (Class 242, subclass 25A)

FY72-74 Activity Indices

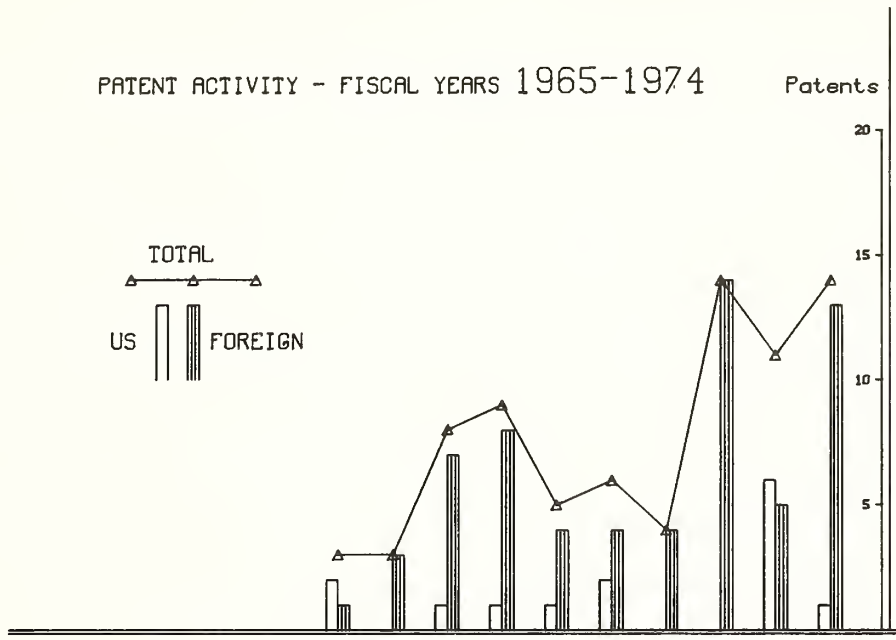
Average % Foreign 77.6% Average % Growth 5.8%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	6	1	2	3	3	1	1	4	9	5	35
UNITED STATES	4		1	1	2	1		1	2	1	13
TOTAL FOREIGN	2	1	1	2	1		1	3	7	4	22
JAPAN								1	6		7
CANADA	1	1						1	1		4
SWITZERLAND										3	3
GERMANY			1		1			1			3
FRANCE				2							2
SWEDEN	1										1
U.S.S.R.							1				1
FINLAND										1	1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



FIBER STRAND FALSE TWISTING DEVICES

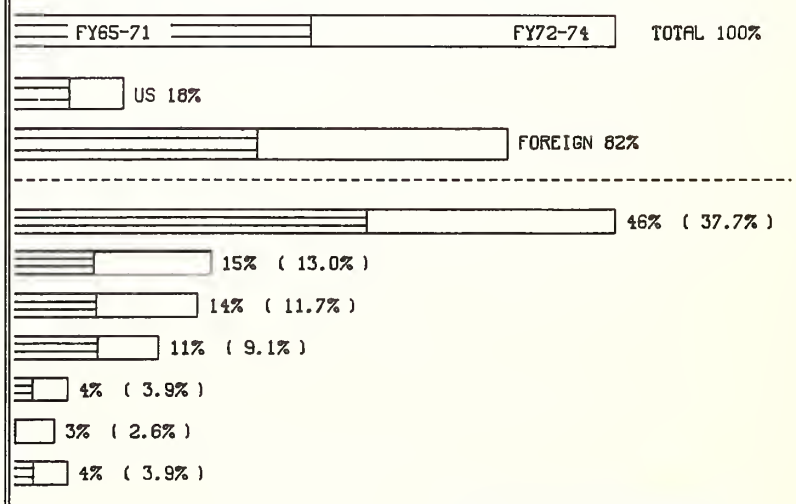
Apparatus which produce a twist in one portion of a strand of filaments or fibers that is equal, and of opposite hand, to that simultaneously produced in an adjacent portion of the strand (i.e., false twist). Included are devices to mount, support, shield or enclose the mechanism (e.g., friction, pin-twist) which produces the false twist. Particularly active are magnetic and/or pneumatic mounting devices which increase speed and also obviate heat problems. (Class 57, subclass 77.45)

FY72-74 Activity Indices

Average % Foreign 79.4% Average % Growth 11.3%

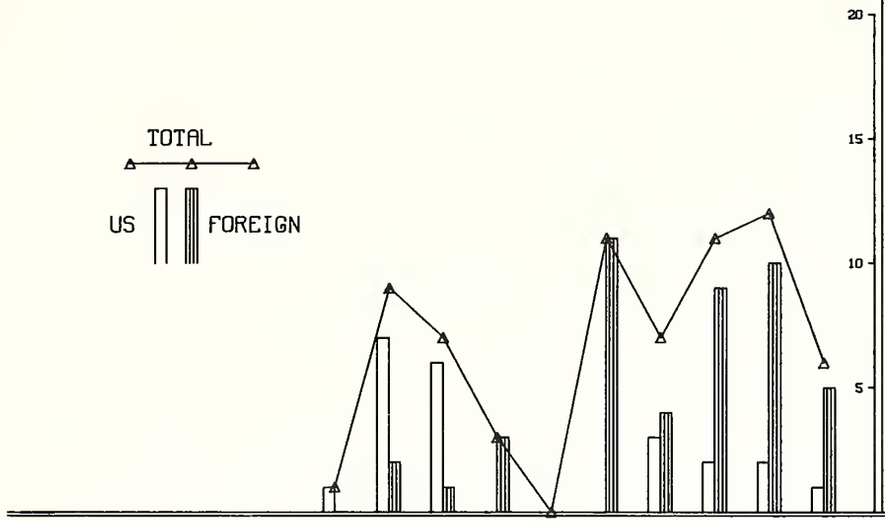
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	3	8	9	5	6	4	14	11	14	77
UNITED STATES	2		1	1	1	2			6	1	14
TOTAL FOREIGN	1	3	7	8	4	4	4	14	5	13	63
UNITED KINGDOM		2	2	6	4	2	1	8	1	3	29
GERMANY	1		1	2				2	2	2	10
SWITZERLAND			2			1	1	1	1	3	9
FRANCE		1	1			1	1		1	2	7
JAPAN							1	1		1	3
IRELAND								1		1	2
ALL OTHER (3)			1					1		1	3

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



MACHINES FOR LIQUID TREATMENT OF TEXTILE MATERIAL

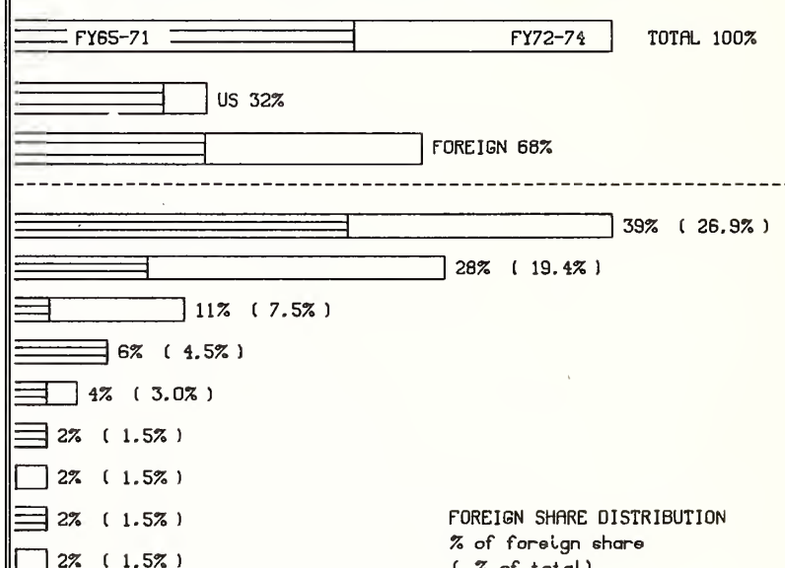
Fixed liquid receptacle fabric treating machines with devices for laying the fabric in pleats, while it is moving through a treating liquor (e.g., a dye or a washing or scouring liquor). The fabric being treated may be in rope or web form and is circulated in a predetermined direction within the treatment bath. (Class 68, subclass 177)

FY72-74 Activity Indices

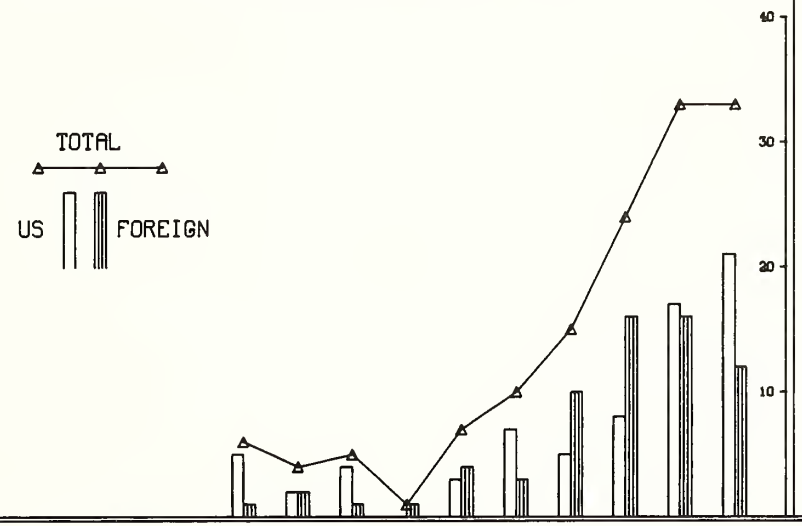
Average % Foreign 82.8% Average % Growth 5.8%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	9	7	3		11	7	11	12	6	67
UNITED STATES	1	7	6				3	2	2	1	22
TOTAL FOREIGN		2	1	3		11	4	9	10	5	45
JAPAN		1		2		6	1	6	1	1	18
GERMANY		1		1			2	2	5	2	13
UNITED KINGDOM						1			2	2	5
ITALY			1			2					3
SWITZERLAND						1			1		2
SWEDEN							1				1
DENMARK									1		1
FRANCE						1					1
SPAIN									1		1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



DYEING OF POLYESTER BLENDS

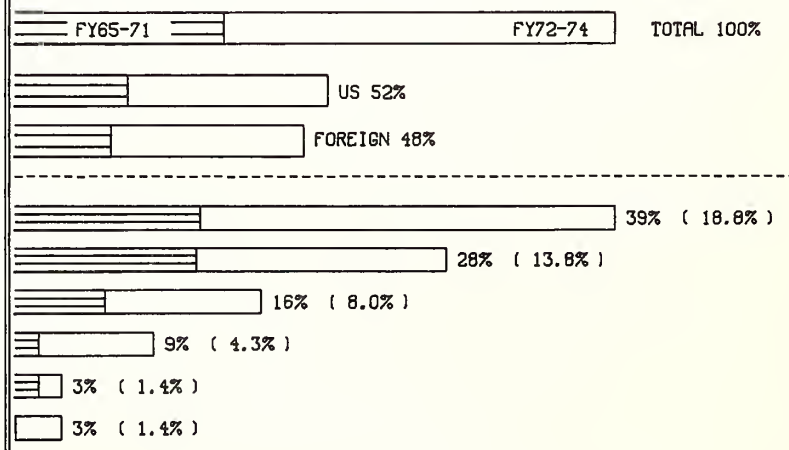
Processes and compositions for coloring, in solid or contrast shades, (1) polyester, polyamide or polyolefin containing textile fabrics of more than one type of fiber, or (2) colored effect threads for these fabrics. Also included are the dyed products of these processes. Representative of the processes and products found here are dyeing of cotton-polyester fabric with disperse and wool dyestuffs in the presence of a leveling agent, and anthraquinone dyed cotton-polyester fibers. (Class 8, subclasses 21B, 21C, 21D)

FY72-74 Activity Indices

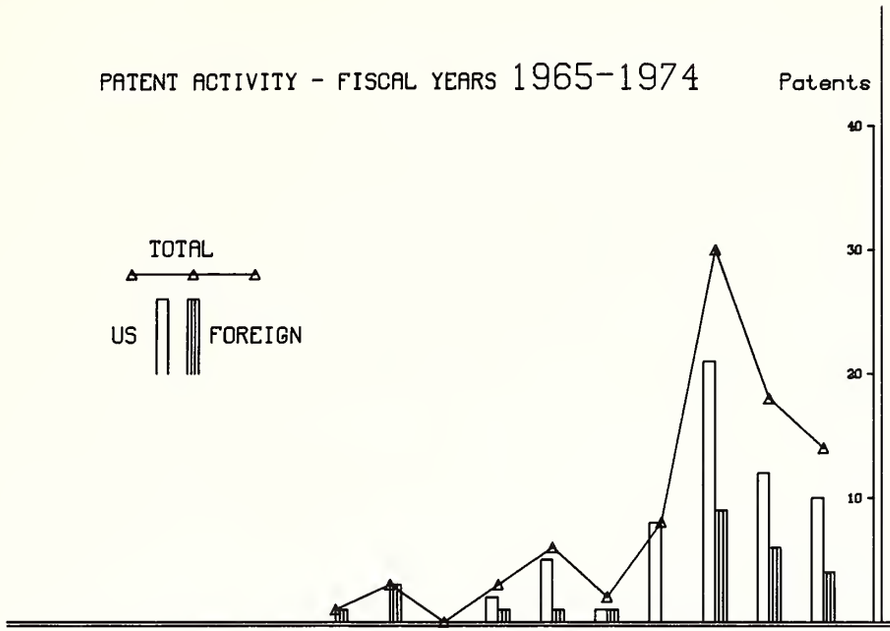
Average % Foreign 48.9% Average % Growth 26.5%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	6	4	5	1	7	10	15	24	33	33	138
UNITED STATES	5	2	4		3	7	5	8	17	21	72
TOTAL FOREIGN	1	2	1	1	4	3	10	16	16	12	66
GERMANY		1			2	1	4	5	9	4	26
SWITZERLAND	1		1		1		5	7		4	19
UNITED KINGDOM				1		2	1	3	2	2	11
JAPAN					1				4	1	6
FRANCE	1									1	2
INDIA								1	1		2

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)



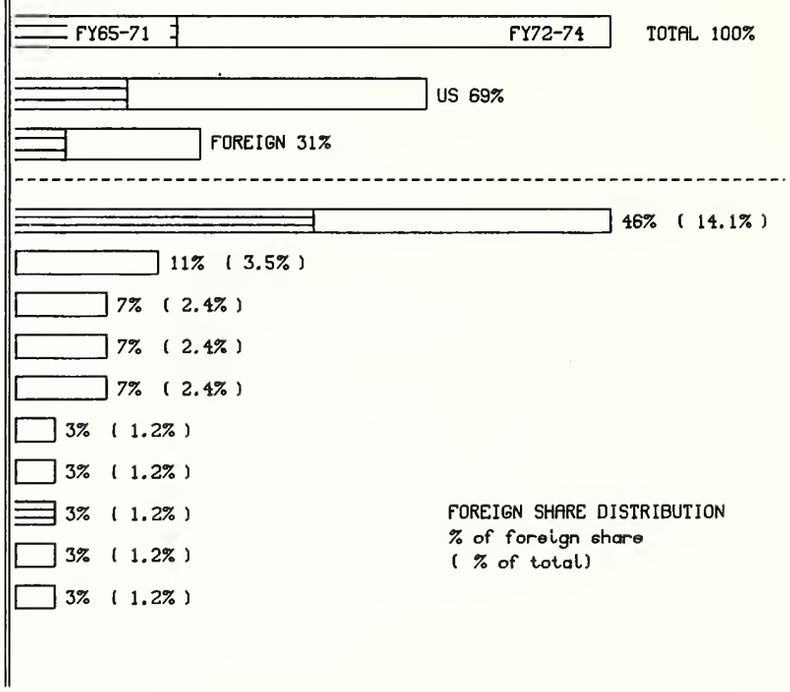
PHYSICAL DEVELOPMENT OF CERTAIN EXPOSED LIGHT SENSITIVE ELEMENTS

Processes and associated compositions for developing exposed light sensitive elements by treating the element with reducible metal ions and appropriate reducing agents. Excluded are processes using elements containing a diazo, chromium, iron or silver sensitizer. Typical of the processes found here is the treatment of an exposed titanium dioxide containing film with a solution of copper and titanous ions to form a visible imagewise distribution of copper metal. (Class 96, subclass 48PD)

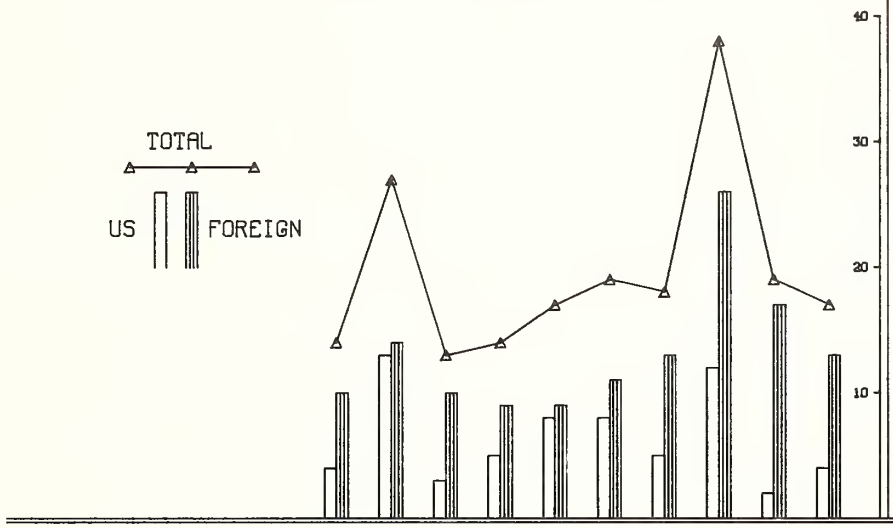
FY72-74 Activity Indices

Average % Foreign 30.7% Average % Growth 38.1%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	3		3	6	2	8	30	18	14	85
UNITED STATES				2	5	1	8	21	12	10	59
TOTAL FOREIGN	1	3		1	1	1		9	6	4	26
NETHERLANDS	1	3		1	1			2	1	3	12
GERMANY								2	1		3
ITALY								2			2
UNITED KINGDOM								1	1		2
BELGUIM									2		2
SWITZERLAND									1		1
BULGARIA								1			1
FRANCE						1					1
CUBA										1	1
JAPAN								1			1



PATENT ACTIVITY - FISCAL YEARS 1965-1974



COLOR PICTURE PRODUCTION

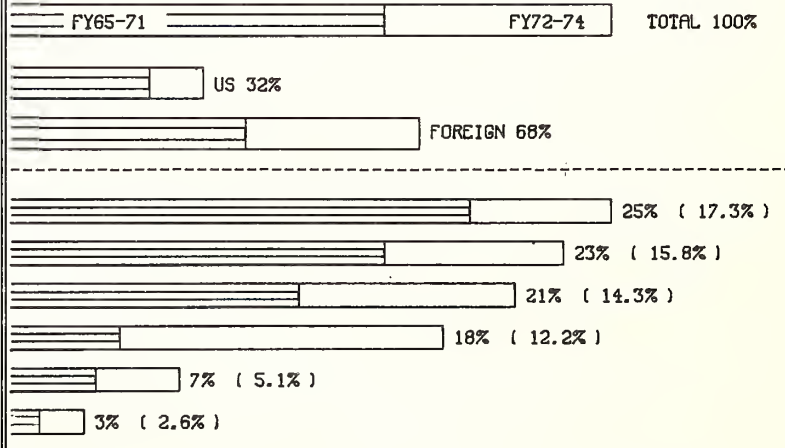
Processes and their associated compositions for obtaining colored pictures from exposed light sensitive compound containing compositions, which include: 1) the application of blue-black toning, antiplumming or antibronzing agents to the silver image; 2) the imagewise destruction of a uniformly distributed dyestuff incorporated in the medium before or after exposure; or, 3) the formation of imagewise dyestuff from the reaction of the oxidized photographic developer with a non-azo hetero-sulfur- or poly-hetero-nitrogen-dye precursor. (Class 96, subclasses 52, 53, 56.3, 56.5)

FY72-74 Activity Indices

Average % Foreign 75.7 % Average % Growth 6.3%

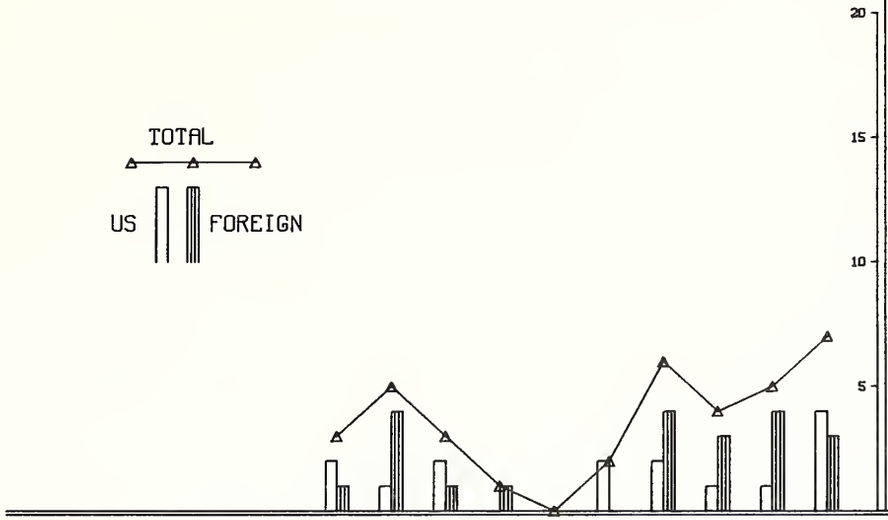
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	14	27	13	14	17	19	18	38	19	17	196
UNITED STATES	4	13	3	5	8	8	5	12	2	4	64
TOTAL FOREIGN	10	14	10	9	9	11	13	26	17	13	132
SWITZERLAND	5	7	4	2	5	3		3	1	4	34
BELGIUM	1	3	3	3	4	2	5	8	1	1	31
GERMANY	3	3		2		4	4	4	5	3	28
JAPAN				1		1	4	7	7	4	24
UNITED KINGDOM	1	1	2	1				3	2		10
ALL OTHER (4)			1			1		1	1	1	5

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	5	3	1		2	6	4	5	7	36
UNITED STATES	2	1	2			2	2	1	1	4	15
TOTAL FOREIGN	1	4	1	1			4	3	4	3	21
GERMANY	1	2	1	1			2	1	1	2	11
BELGIUM		1							2		3
UNITED KINGDOM							1	2			3
SWITZERLAND							1			1	2
AUSTRIA		1									1
FRANCE									1		1

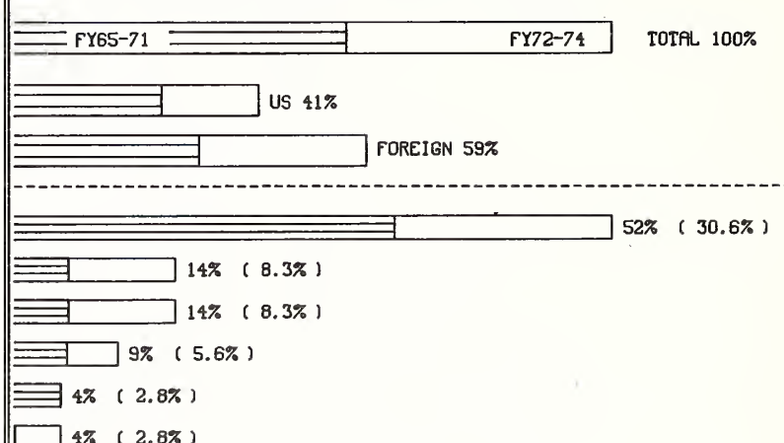
SUBTRACTIVE METHODS FOR PRODUCING COLOR PICTURES

Processes for photographically producing pictures approximating natural color by first superimposing colored part-image records according to the subtractive principle of color photography, and then printing the subtractively colored picture onto a light sensitive element. The element comprises a plurality of materials which are sensitive to different spectral regions and which lie in generally superposed relation to one another. These processes are useful for obtaining color prints from color negatives. (Class 96, subclass 23)

FY72-74 Activity Indices

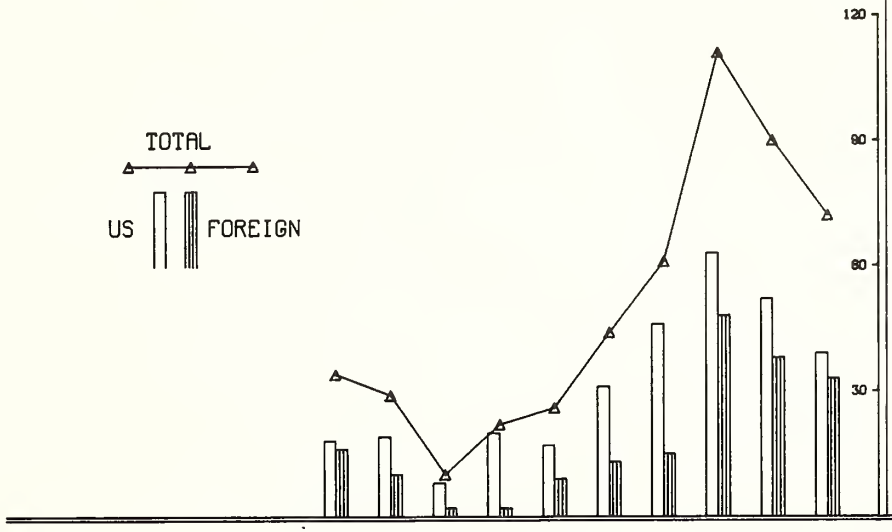
Average % Foreign 67.0% Average % Growth 5.7%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



ELECTROPHOTOGRAPHIC MEDIA

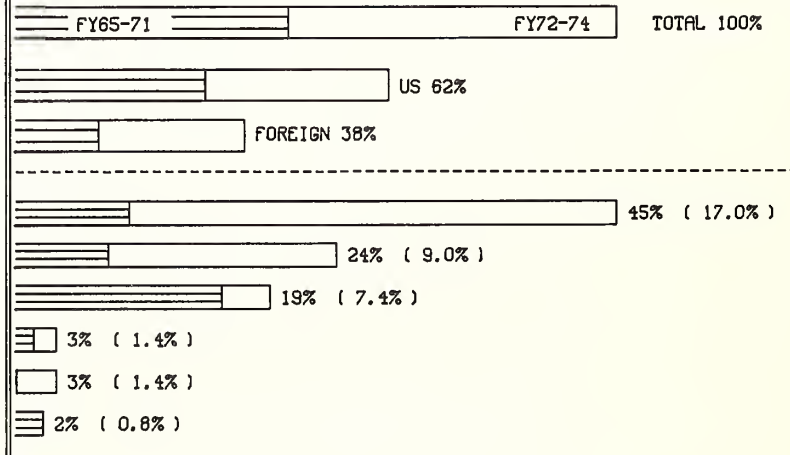
Photoconductive elements or compositions for recording a visual image on exposure to light, which contain a photoconductor (e.g., polyvinyl carbazole, cadmium sulfide or zinc oxide) and a dye sensitizer, or which contain zinc oxide in the absence of a dye sensitizer. The dye sensitizer is a known coloring material, such as cyanine dye, that changes the optical sensitivity of the photoconductor by imparting its light absorption to the photoconductor. These media are particularly useful in the electrophotocopying process often referred to as xerography. (Class 96, subclasses 1.6-1.8)

FY72-74 Activity Indices

Average % Foreign 43.6% Average % Growth 22.5%

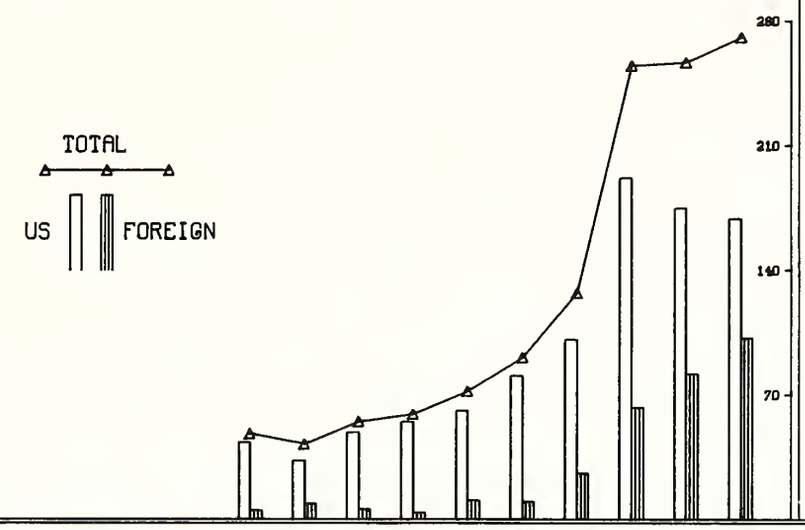
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	34	29	10	22	26	44	61	111	90	72	499
UNITED STATES	18	19	8	20	17	31	46	63	52	39	313
TOTAL FOREIGN	16	10	2	2	9	13	15	48	38	33	186
JAPAN					3	4	9	25	23	21	85
BELGIUM	3	1		2	1	5	1	16	10	6	45
GERMANY	13	9	2		2	1	3	3	2	2	37
SWITZERLAND					1		2	2	1	1	7
UNITED KINGDOM								2	2	3	7
FRANCE					1	3					4

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



ELECTRIC PHOTOGRAPHY PHOTOCOPYING MACHINES

Photocopying machines which utilize electrophotographic (e.g., xerographic) processes. Included are machines which employ processes designed to reproduce originals in full color. Also included are machines which 1) copy on both sides of the paper, 2) select from available supplies of varying width paper and cut to length commensurate with the original, or 3) have sorting or collating features. Particularly active are efforts directed toward development of compact machines capable of reproducing relatively large originals. (Class 355, subclasses 3R-16)

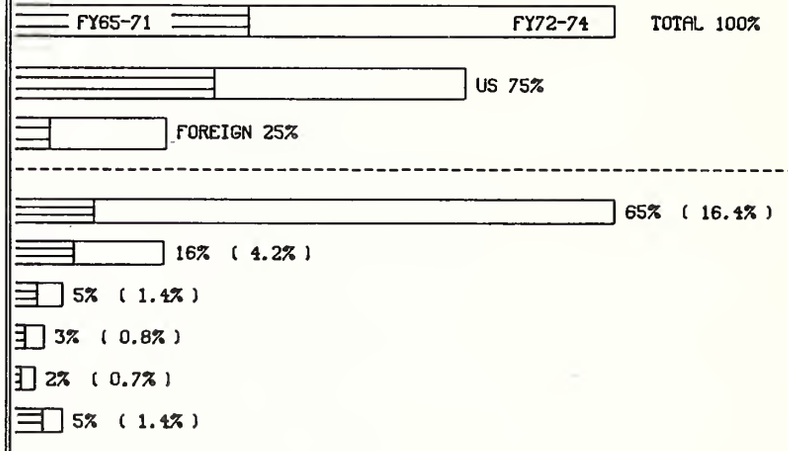
FY72-74 Activity Indices

Average % Foreign 31.5%

Average % Growth 25.6%

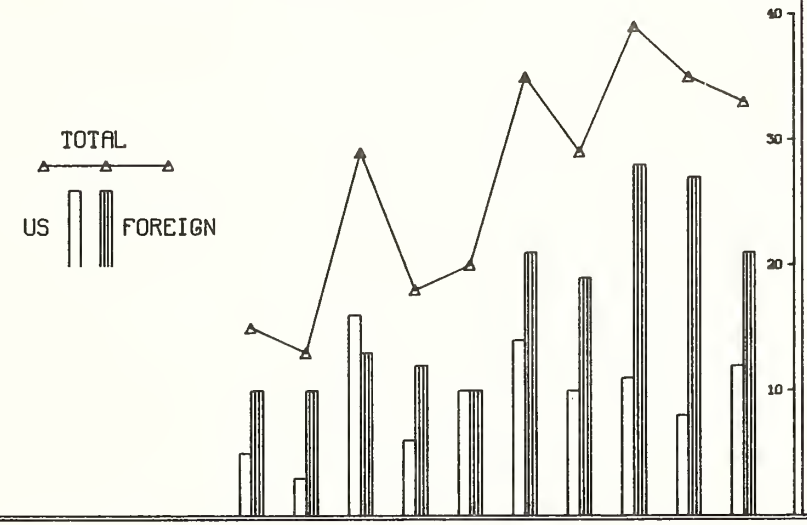
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	48	42	55	59	72	91	127	255	257	271	1277
UNITED STATES	43	33	49	55	61	81	101	192	175	169	959
TOTAL FOREIGN	5	9	6	4	11	10	26	63	82	102	318
JAPAN	1	1	1	2	4	2	16	46	64	72	209
GERMANY	3	5	3	1	5		4	13	11	9	54
UNITED KINGDOM	1	1			1	2	3	3	2	5	18
AUSTRALIA		1		1			1		2	5	10
FRANCE			1			1			2	5	9
ALL OTHER (6)		1	1		1	5	2	1	1	6	18

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



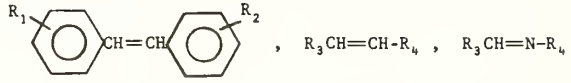
FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



CERTAIN COMPOUNDS CONTAINING AN INTERCYCLIC ACYCLIC METHINE LINKAGE

Compounds and their preparation of the general formulae:



I II III

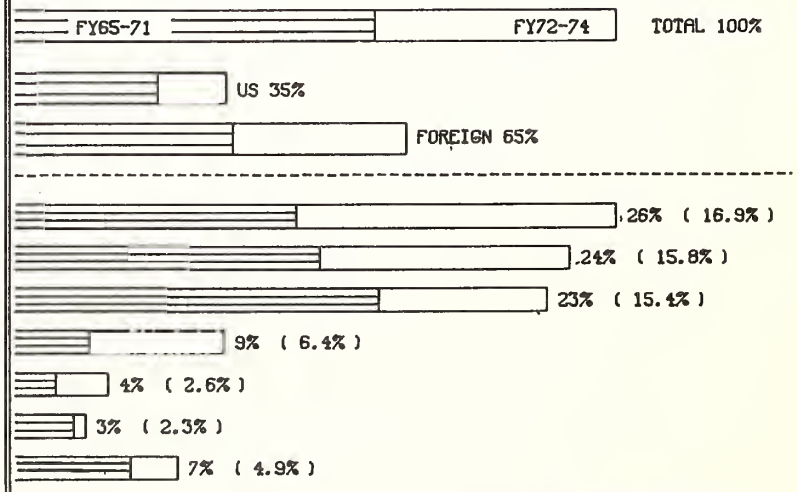
wherein R_1 and/or R_2 is a triazinyl or triazoyl group; R_3 and R_4 are cyclic containing groups, one of which contains one or more nitro groups and at least one of which is heterocyclic containing. Compounds of formula I, such as 2-(4-stilbyl) naphthotriazoles, are useful as optical brighteners. Compounds of formula II and III have antibacterial, antifungal and/or antiprotozoan activity and are particularly useful in treating infections in man and domestic animals. Typical of these compounds are 1-(5'-nitrofurylideneamino) hydantoins used in the treatment of urinary tract infections. (Class 260, subclasses 240A, 240B, 240C)

FY72-74 Activity Indices

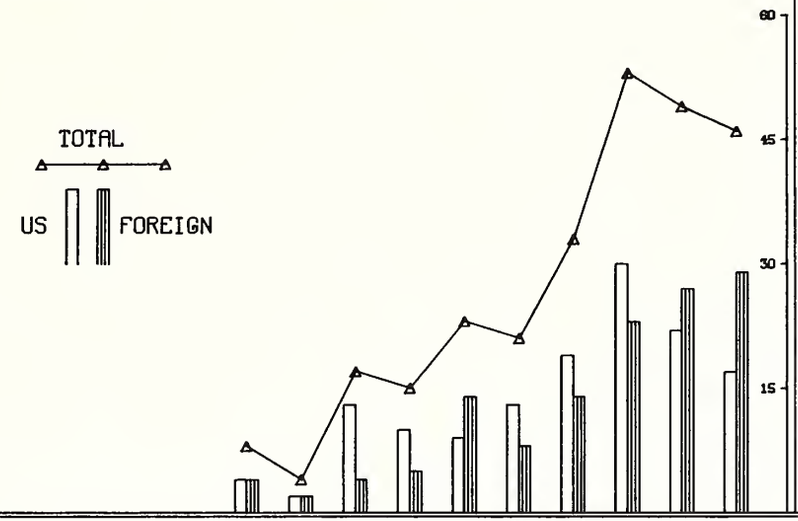
Average % Foreign 71.0% Average % Growth 11.6%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	15	13	29	18	20	35	29	39	35	33	266
UNITED STATES	5	3	16	6	10	14	10	11	8	12	95
TOTAL FOREIGN	10	10	13	12	10	21	19	28	27	21	171
GERMANY	1	2	3	1	1	7	6	13	4	7	45
SWITZERLAND	1	5	2	4	2	3	6	1	9	9	42
JAPAN	6		4	5	2	7	4	6	7		41
UNITED KINGDOM	1		2	1	2			5	4	2	17
FRANCE		1					2	2	2		7
ITALY			2		2	1				1	6
ALL OTHER (8)	1	2		1	1	3	1	1	1	2	13

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



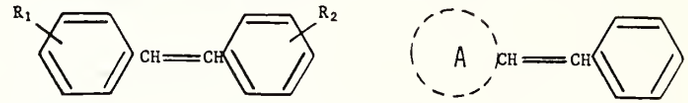
PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	8	4	17	15	23	21	33	53	49	46	269
UNITED STATES	4	2	13	10	9	13	19	30	22	17	139
TOTAL FOREIGN	4	2	4	5	14	8	14	23	27	29	130
SWITZERLAND		1		1	5	2	4	8	10	13	44
GERMANY	4	1	2	1	5	2	6	3	8	8	40
JAPAN			1	2	3		1	5	5	2	19
UNITED KINGDOM			1	1		2	1	4	2		11
FRANCE					1	1		1		4	7
BELGIUM						1	1	1	1		4
ALL OTHER (4)							1	1	1	2	5

HETEROCYCLIC STILBENES AND STYRENES

Compounds and their preparation of the general formulae:



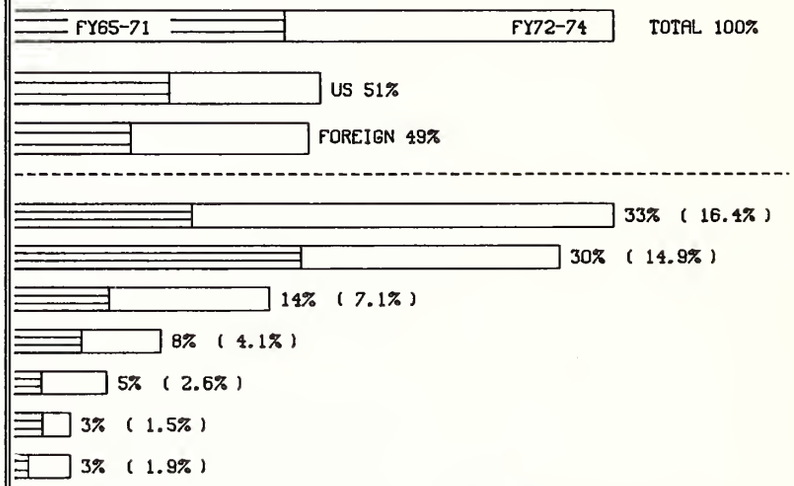
Wherein (A) represents a heterocyclic ring and R_1 and/or R_2 contains a heterocyclic ring. Excluded are compounds where R_1 or R_2 is a triazinyl or triazoyl group. Typical examples of compounds found here are 5-phenyl - 2- stilbenylbenzoxazoles and 1-phenyl-2-styryl-4-alkyl-3, 5-dioxo pyrazolidines. These compounds are useful as pharmaceuticals or optical brighteners. (Class 260, subclasses 240CA, 240D)

FY72-74 Activity Indices

Average % Foreign 53.4%

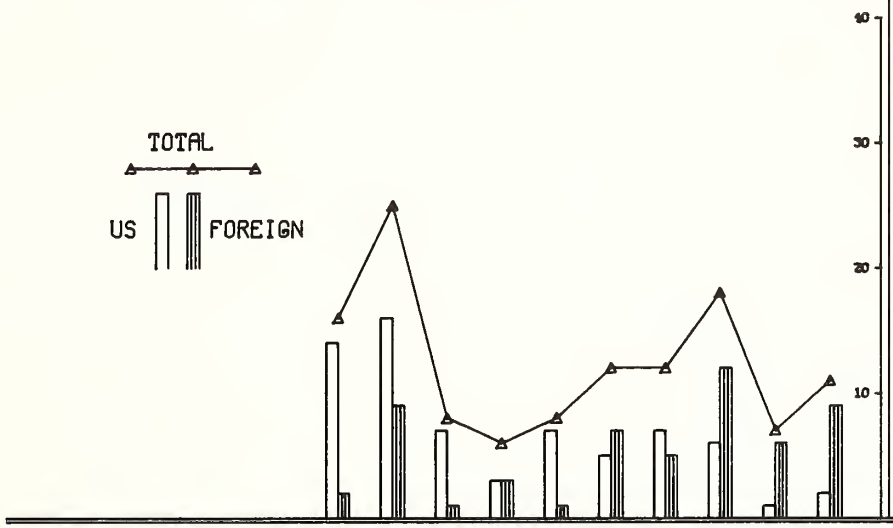
Average % Growth 22.7%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	16	25	8	6	8	12	12	18	7	11	123
UNITED STATES	14	16	7	3	7	5	7	6	1	2	68
TOTAL FOREIGN	2	9	1	3	1	7	5	12	6	9	55
GERMANY	1	2		2	1	3	4	4	1	2	20
FRANCE		3				3		4	1	1	12
SWITZERLAND	1	1				1		3	2	1	9
JAPAN							1			3	4
CANADA								1	1		2
UNITED KINGDOM		1		1							2
AUSTRIA										2	2
ALL OTHER (4)		2	1						1		4

2-SUBSTITUTED OXAZOLES AND OXAZOLIDINES

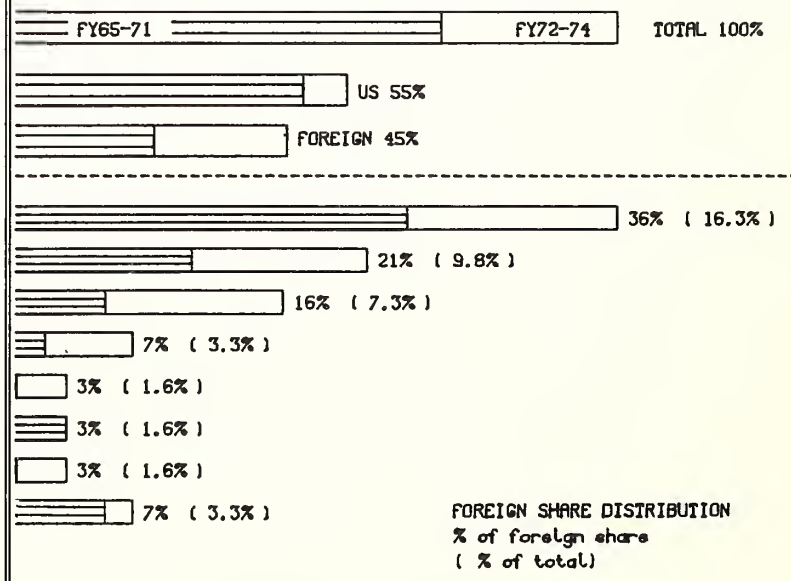
2-oxo- or thioxo-oxazoles or oxazolidines and their preparation. Excluded are compounds also containing azinyl, azolyl, sulfoneazolyl, thiaazolyl, heavy metal or aluminum azolyl, or a six member ring containing one nitrogen. The products found here have various utilities, such as analgesics, e.g., 5-dimethylaminomethyl-3-phenyl-2-oxazolidinone; and dye stuff intermediates, e.g., 6-[(2-hydroxyethyl) sulfonyl] -2- benzoxazolinone. (Class 260, subclass 307C)

FY72-74 Activity Indices

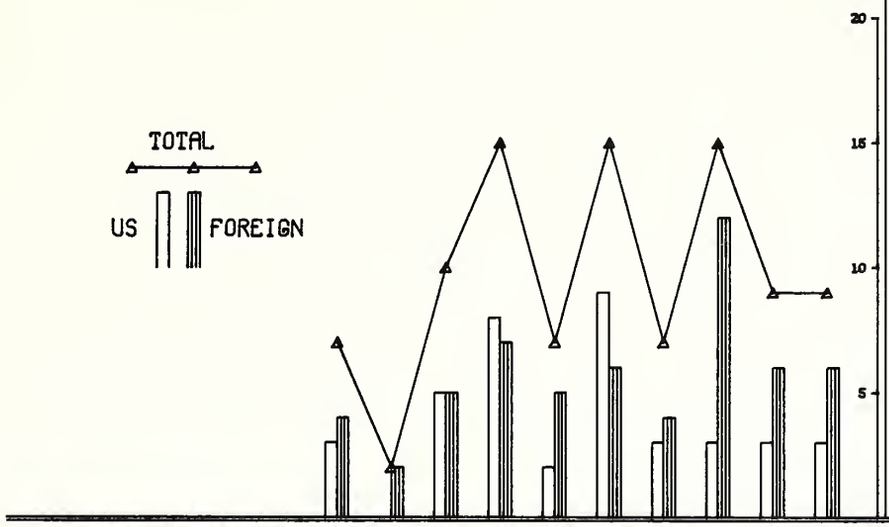
Average % Foreign 78.1%

Average % Growth 5.9%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



HETEROCYCLIC NITROGEN COMPOUNDS

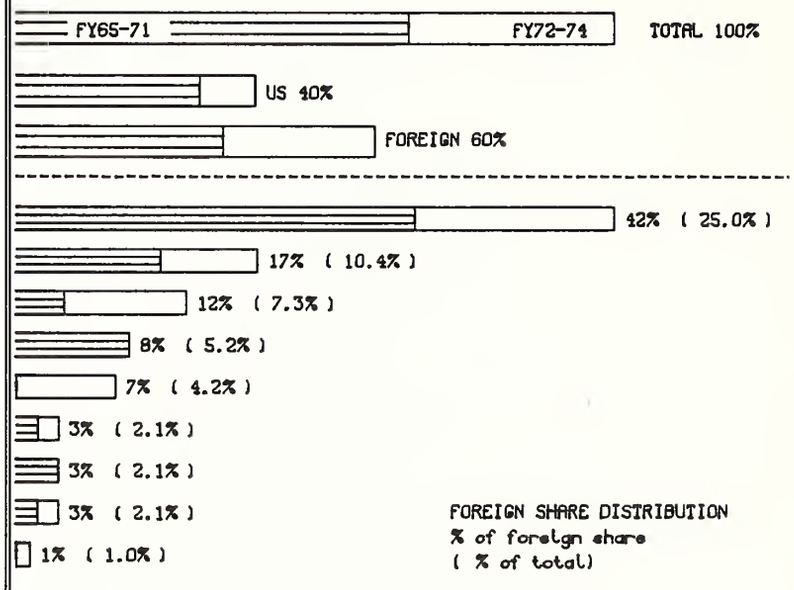
Heterocyclic compounds, and their preparation, containing one nitrogen as the only hetero-atom in a ring of seven or more atoms, and two hydrocarbon rings fused to different adjacent carbons of the hetero-ring. Products found here are mainly useful as pharmaceuticals. The majority have psychotropic or neurotropic activity (e.g., 10-oxo-10, 11 - dihydro-5H-dibenz [b, f] azepine -5- carboxamide, a depressant for treating epilepsy and trigeminal neuralgia). (Class 260, subclass 239D)

FY72-74 Activity Indices

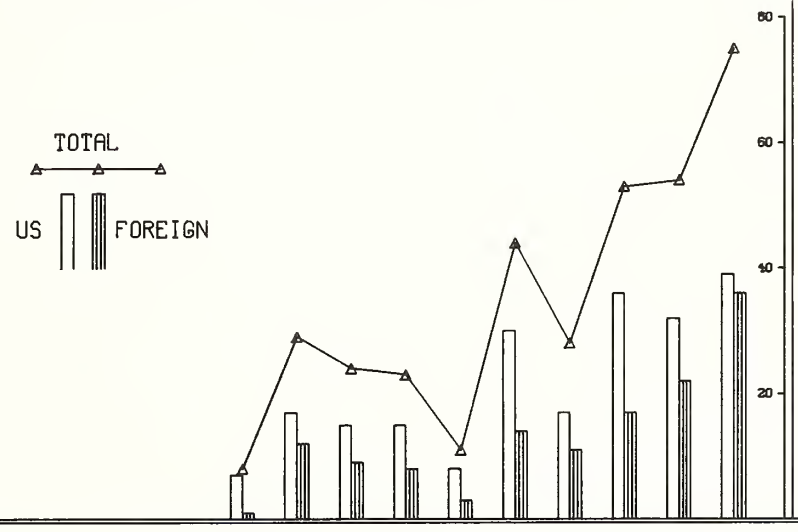
Average % Foreign 68.9% Average % Growth 9.4%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	7	2	10	15	7	15	7	15	9	9	96
UNITED STATES	3		5	8	2	9	3	3	3	3	39
TOTAL FOREIGN	4	2	5	7	5	6	4	12	6	6	57
SWITZERLAND	3	2	3	2	3	3		5	1	2	24
GERMANY			1	2	1		2	3		1	10
FRANCE					1	1		1	1	3	7
UNITED KINGDOM				3		1	1				5
JAPAN								1	3		4
SWEDEN	1							1			2
DENMARK			1				1				2
CANADA						1			1		2
ITALY								1			1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74

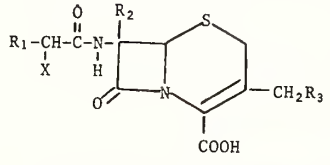


PATENT ACTIVITY - FISCAL YEARS 1965-1974



CEPHAM OR CEPHEM RING CONTAINING COMPOUNDS

5- thia- 1- aza- bicyclo [4.2.0]- octane (cepham) or octene (cephem) ring containing compounds and their preparation. These compounds are useful as antibiotics, particularly in the treatment of infections caused by pathogenic bacteria which are resistant to other antibiotics. Examples are compounds of the structure:



X is hydrogen, hydroxy or amino
R_1 is phenyl, phenoxy or 2-thienyl
R_2 is hydrogen or methoxy
R_3 is hydrogen, acetoxy, heterocyclic-S-CH_2—, or 1-pyridyl.

(Class 260, subclass 243C)

FY72-74 Activity Indices

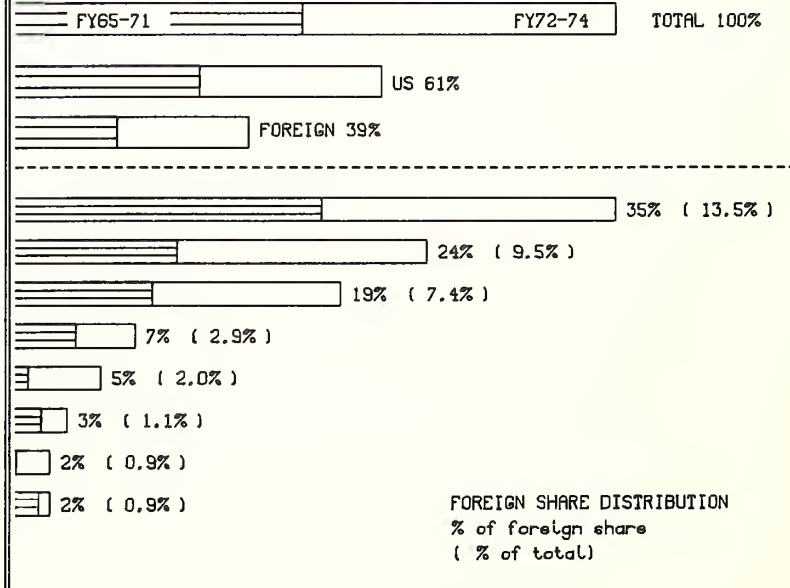
Average % Foreign 41.2%

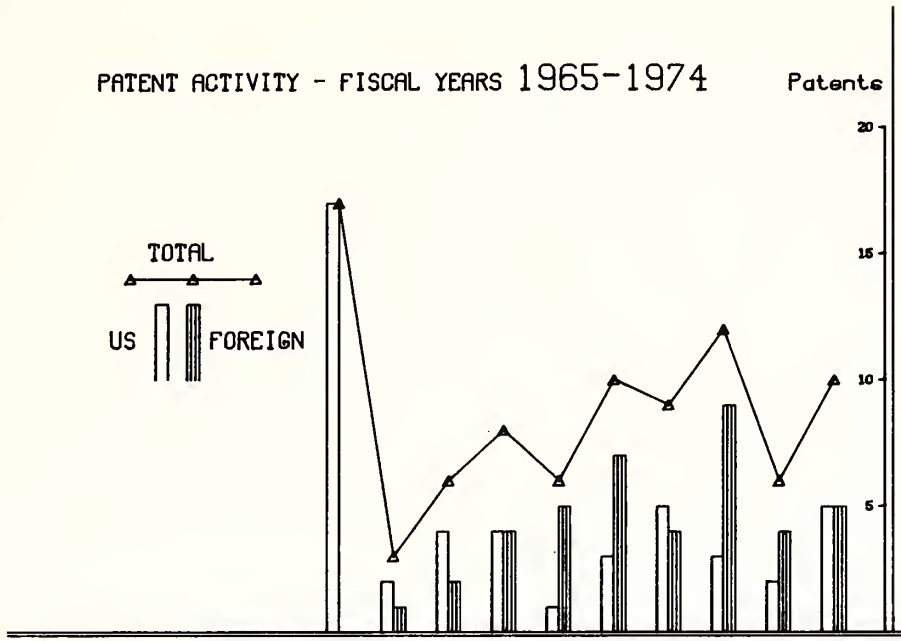
Average % Growth 26.5%

55

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	8	29	24	23	11	44	28	53	54	75	349
UNITED STATES	7	17	15	15	8	30	17	36	32	39	216
TOTAL FOREIGN	1	12	9	8	3	14	11	17	22	36	133
UNITED KINGDOM	1	7	5	1	2	4	4	7	8	8	47
SWITZERLAND		4	1	1		4	3	5	9	6	33
JAPAN			1	5	1	2	2		1	14	26
CANADA			2			2	1	2		3	10
GERMANY		1							3	3	7
NETHERLANDS						1	1			2	4
FRANCE								2	1		3
ALL OTHER (3)				1		1		1			3

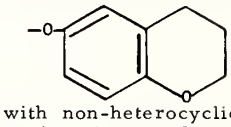
DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74





6-OXYCHROMANS

Compounds and their preparation containing the grouping

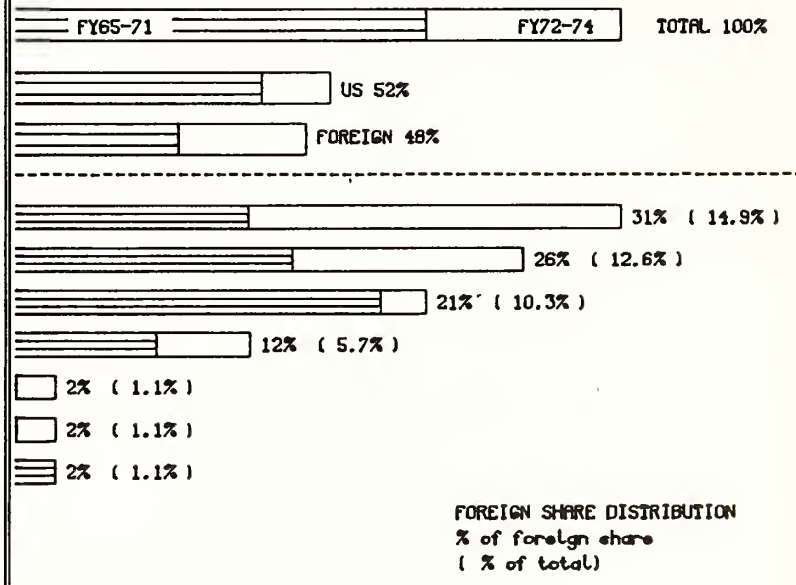


optionally substituted with non-heterocyclic substituents or 5-membered rings having 4-carbons and 1-oxygen atom as ring members. Representative of the compounds found here are chromanes and flavanes, useful as flavorants or odorants, and tocopherols (e.g., vitamin E), useful as pharmaceuticals. (Class 260, subclass 345.5)

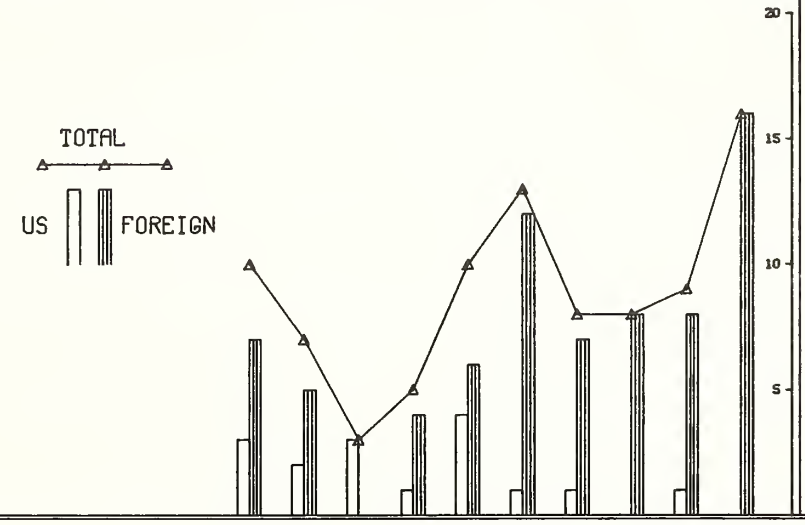
FY72-74 Activity Indices

Average % Foreign 63.9 % Average % Growth 6.2%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	17	3	6	8	6	10	9	12	6	10	87
UNITED STATES	17	2	4	4	1	3	5	3	2	5	46
TOTAL FOREIGN		1	2	4	5	7	4	9	4	5	41
UNITED KINGDOM				2	1	1	1	4	2	2	13
JAPAN				1	1	3	1	2	2	1	11
GERMANY		1	1		3	1	2			1	9
SWITZERLAND			1	1		1		1		1	5
CZECHOSLOVAKIA								1			1
AUSTRIA								1			1
DENMARK						1					1



PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	10	7	3	5	10	13	8	8	9	16	89
UNITED STATES	3	2	3	1	4	1	1		1		16
TOTAL FOREIGN	7	5		4	6	12	7	8	8	16	73
GERMANY	3	3		1	1	7	4	7	7	14	47
JAPAN					2	1	1			2	6
SWITZERLAND	2	1				2					5
UNITED KINGDOM		1		1			2	1			5
CANADA					3	1					4
FRANCE				1		1					2
ALL OTHER (4)	2			1					1		4

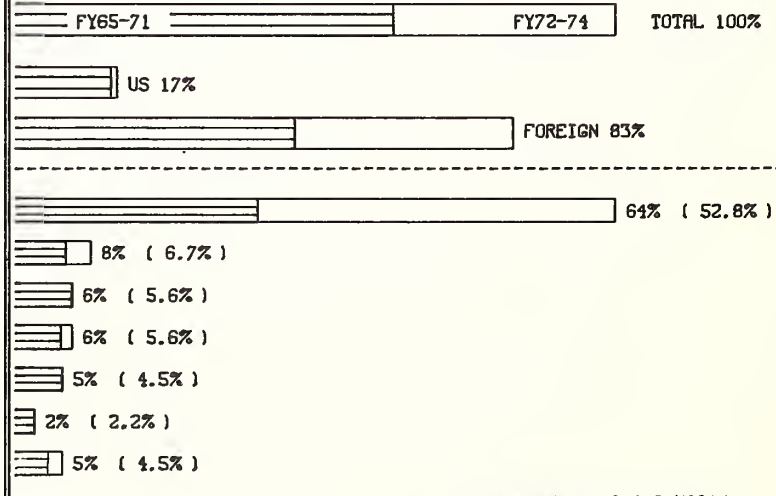
CYCLOPENTANOHYDROPHENANTHRENE CONTAINING GLYCOSIDES

Glycosides and their preparation wherein the aglycone contains a cyclopentanohydrophenanthrene nucleus and the sugar consists of monomer units of at least five carbon atoms in cyclic form. Most of the products found here, such as digitoxin and derivatives thereof, have cardiotonic activity. (Class 260, subclass 210.5)

FY72-74 Acitivity Indices

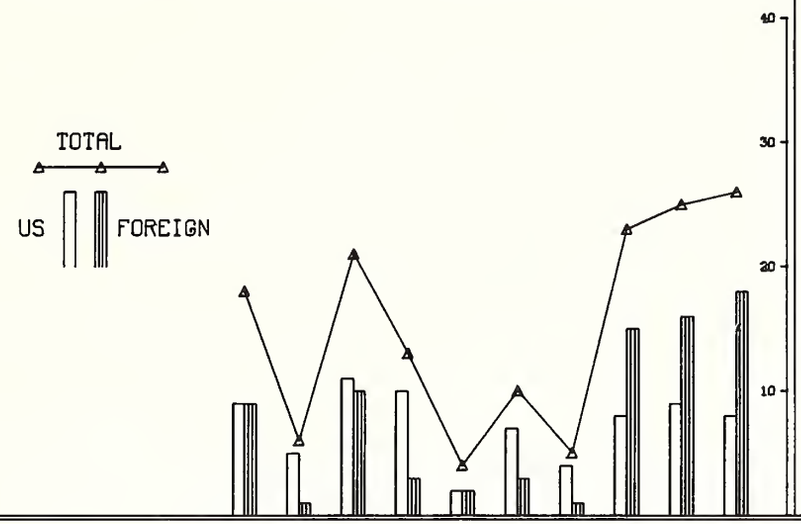
Average % Foreign 96.3% Average % Growth 6.5%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



FERMENTATES OF UNKNOWN STRUCTURE

Bio-affecting and body treating compositions and drugs containing as an active ingredient a fermentate of known empirical formula but unknown chemical structure, and having a carbon content of either 45-55% or over 62%. Many of the compounds found here are useful as antibiotics, e.g., janiemycin and fungimycin. (Class 424, subclasses 118, 122)

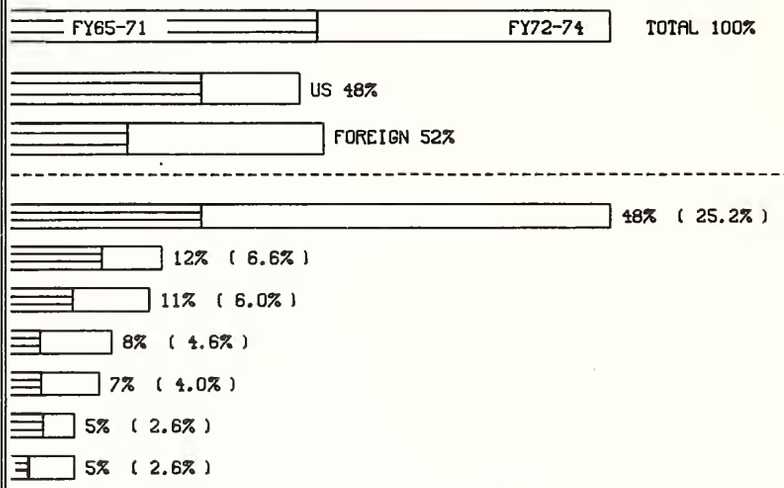
FY72-74 Activity Indices

Average % Foreign 66.2%

Average % Growth 15.5%

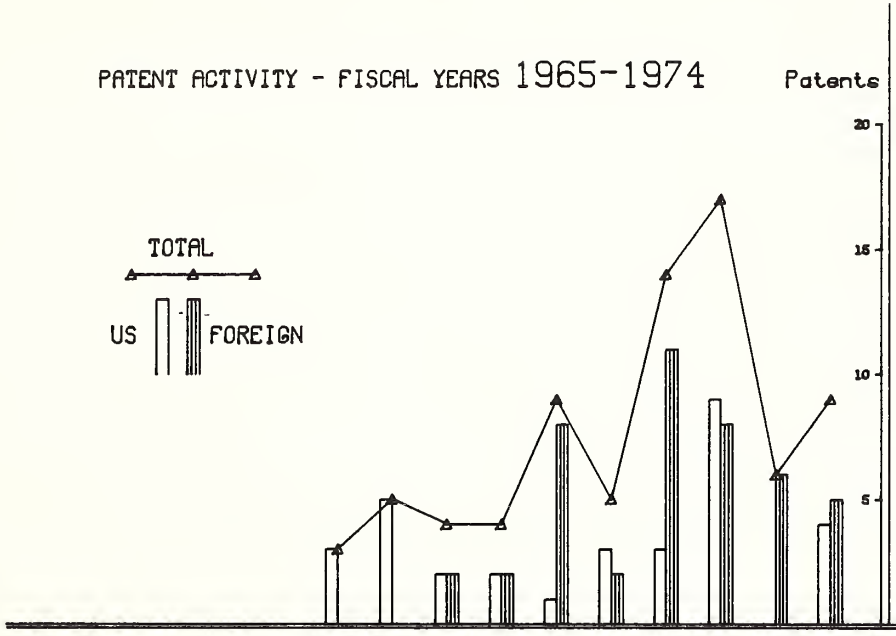
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	18	6	21	13	4	10	5	23	25	26	151
UNITED STATES	9	5	11	10	2	7	4	8	9	8	73
TOTAL FOREIGN	9	1	10	3	2	3	1	15	16	18	78
JAPAN	5		3	3			1	9	8	9	38
SWITZERLAND	1		2		1	2		1	1	2	10
ITALY	2		2					1	1	3	9
FRANCE	1		1					2	2	1	7
GERMANY		1			1			2	1	1	6
UNITED KINGDOM			1			1			1	1	4
ALL OTHER (4)			1						2	1	4

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	5	4	4	9	5	14	17	6	9	76
UNITED STATES	3	5	2	2	1	3	3	9		4	32
TOTAL FOREIGN			2	2	8	2	11	8	6	5	44
JAPAN					2	2	3	1	4	4	16
UNITED KINGDOM			2		4		3	3			12
GERMANY				1			2	3	2	1	9
FRANCE					2		2				4
ITALY							1	1			2
BELGIUM				1							1

UNSATURATED ACIDS FROM UNSATURATED ALDEHYDES

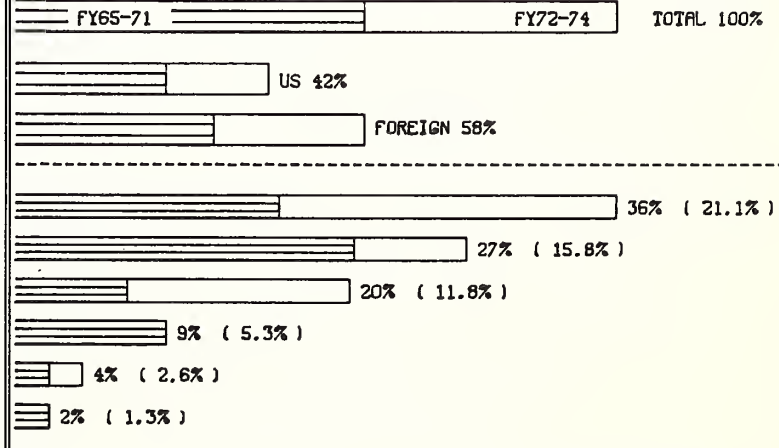
Processes for preparing unsaturated acids by the oxidation of unsaturated aldehydes. The oxidizing agent most often used is molecular oxygen in the presence of a metal oxide based catalyst system. Recent emphasis has been on vapour phase oxidations using molybdenum oxide containing catalysts, e.g., the vapour phase oxidation of acrolein with molecular oxygen in the presence of combined oxides of molybdenum, vanadium and tungsten. (Class 260, subclass 530N)

FY72-74 Activity Indices

Average % Foreign 67.5%

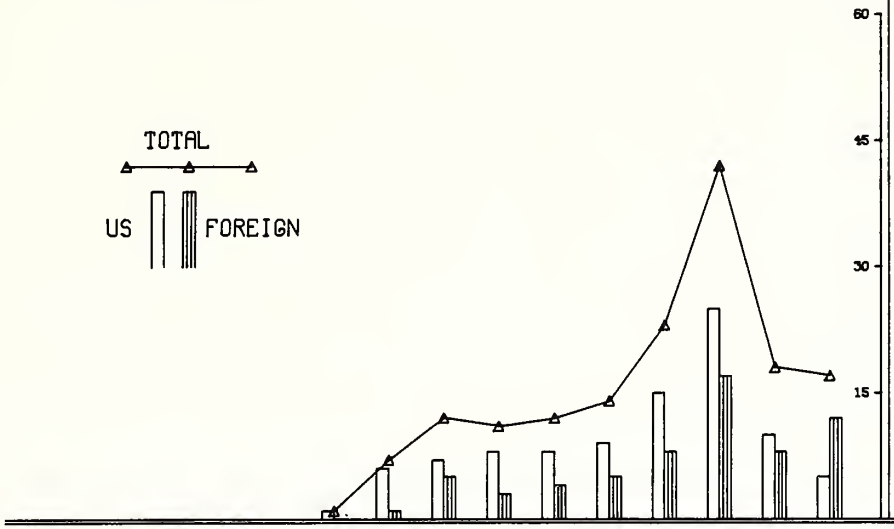
Average % Growth 10.7%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	1	7	12	11	12	14	23	42	18	17	157
UNITED STATES	1	6	7	8	8	9	15	25	10	5	94
TOTAL FOREIGN		1	5	3	4	5	8	17	8	12	63
GERMANY			2		2	3		11	1	5	24
JAPAN					1	1	1	4	3	5	15
UNITED KINGDOM			2		1	1	7	1		1	13
ITALY								1	3		4
FRANCE			1	2							3
ALL OTHER (4)		1		1					1	1	4

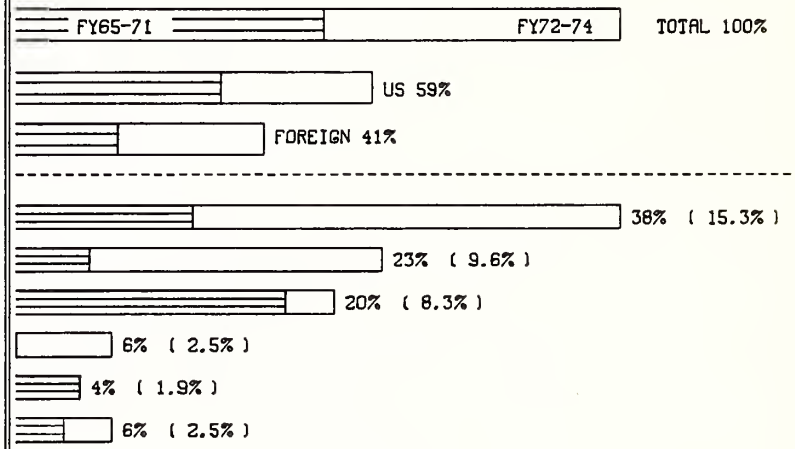
PROCESSES FOR PREPARING ESTERS FROM OLEFINS

Processes for preparing esters of alkanoic acid of less than 8 carbon atoms by oxidation of olefins in the presence of group VIII noble metal catalysts. Included are processes for alkenylation of acids and carbonylation of olefins. Representative examples are the preparation of vinyl acetate from acetic acid and ethylene in the presence of a catalyst composition of palladium, alkali metal acetate and metallic gold, and the preparation of methyl methacrylate from propylene, methanol, oxygen and carbon monoxide in the presence of palladium chloride. These unsaturated ester products are useful as intermediates in the production of plastics, adhesives, paints and coatings for paper and textiles. (Class 260, subclass 497A)

FY72-74 Activity Indices

Average % Foreign 48.1% Average % Growth 25.1%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



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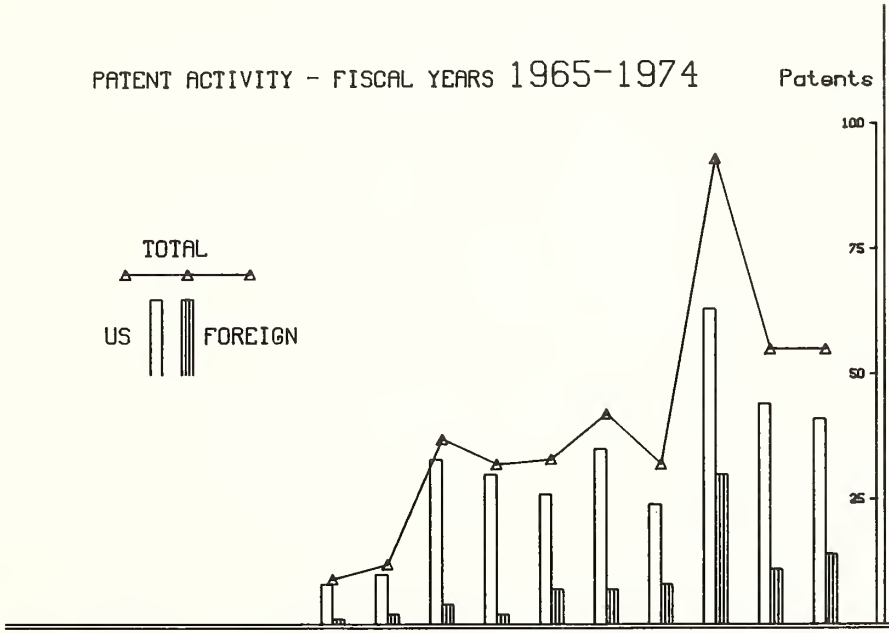


SYNTHETIC RESINOUS BLOCK COPOLYMERS

Synthetic resinous block copolymers prepared from the interpolymerization of an ethylenically unsaturated resinous polymer and another ethylenically unsaturated non-resinous material wherein:

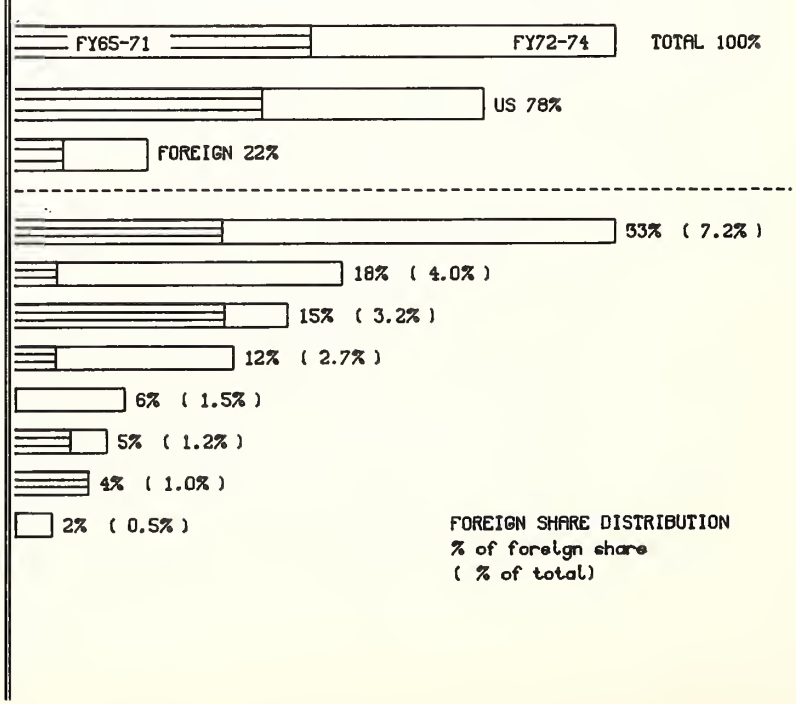
1) the reaction mixture contains unbranched monoalkenes or polymers thereof;
2) the reaction mixture contains a conjugated diolefin polymer and a vinylidene aromatic monomer, or products resulting therefrom; or,
3) an additional synthetic resin is added subsequent to the interpolymerization.

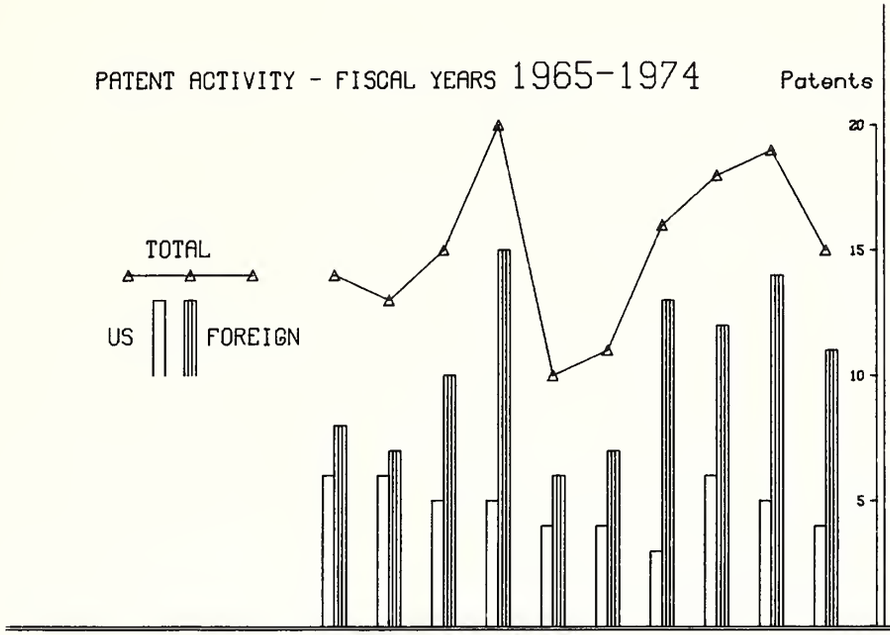
Excluded from (1) and (2) are products arising from processes involving activation of the polymer before polymerization. Representative of the compositions found here is polystyrene-polybutadiene block polymer copolymerized with monovinyl pyridines, acrylic acid esters or acrylamides. These compositions have improved processability and stress-strain properties and are useful in the plastic or rubber fields as coating materials and in making rubber hoses, toys, and the like. (Class 260, subclasses 876B, 878B, 880B)

FY72-74 Activity Indices

Average % Foreign 27.1% Average % Growth 25.2%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	9	12	37	32	33	42	32	93	55	55	400
UNITED STATES	8	10	33	30	26	35	24	63	44	41	314
TOTAL FOREIGN	1	2	4	2	7	7	8	30	11	14	86
JAPAN				1	1	4	4	11	3	5	29
GERMANY			1			1		7	3	4	16
UNITED KINGDOM		2	1	1	3	1	2	2	1		13
CANADA						1	1	7	1	1	11
FRANCE								1	2	3	6
NETHERLANDS			2				1	1		1	5
ITALY	1				3						4
ALL OTHER (2)								1	1		2





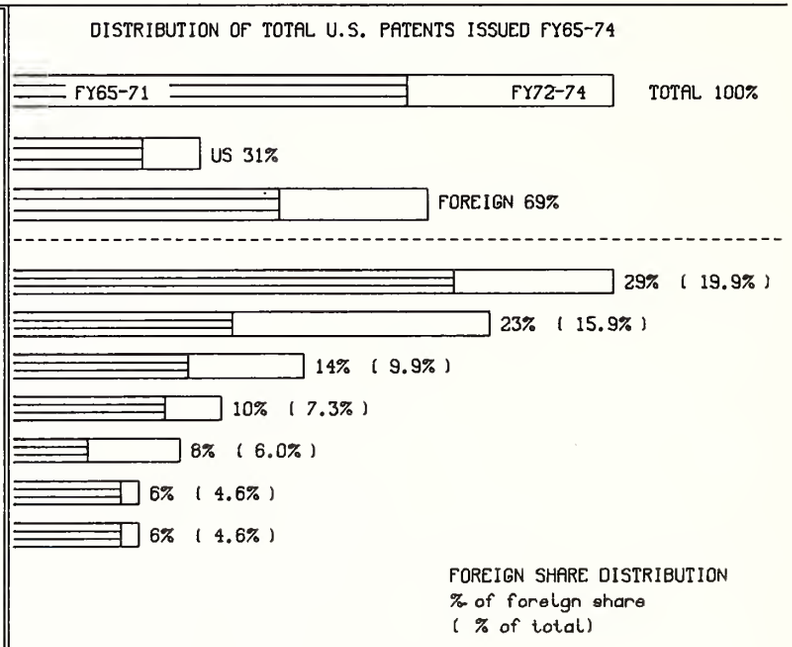
PREPARATION, RECOVERY AND PURIFICATION OF LACTAMS

Processes for the preparation, recovery and purification of monocyclic lactams having 7 or more ring atoms. Recent preparation and recovery methods avoid or reduce the formation of ammonium sulfate by-product (from oximes and sulfuric acid followed by ammonia treatment). Examples of these are 1) the vapour phase rearrangement of oximes in the presence of boric acid, and 2) the addition of ammonium sulfate to a lactam-sulfuric acid mixture followed by extraction of the lactam from the resulting less acidic solution. Recent purification methods, among others, employ selective solvent extraction procedures to obtain very pure lactams. The lactam products are useful in making nylon or nylon-type fibers. (Class 260, subclass 239.3A)

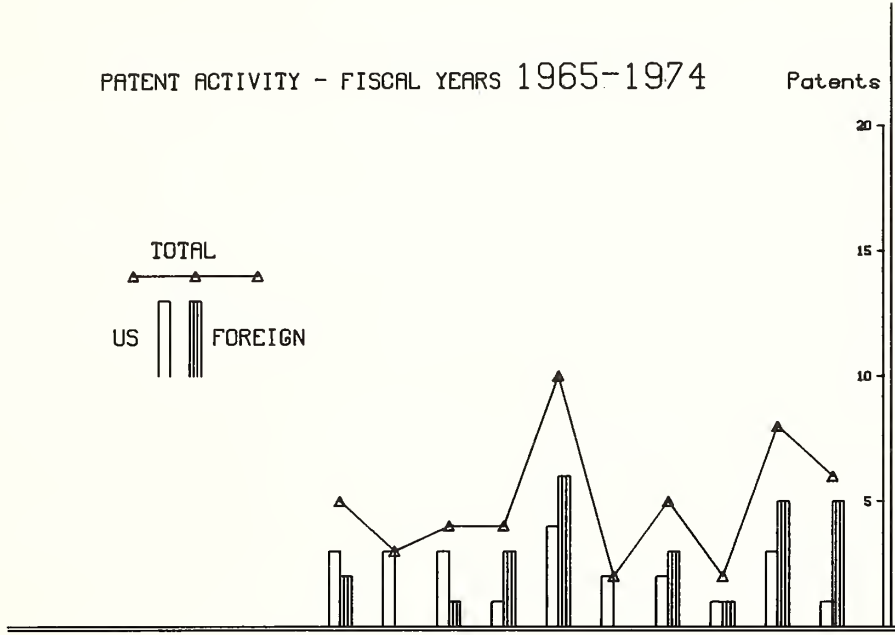
FY72-74 Activity Indices

Average % Foreign 71.2% Average % Growth 7.1%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	14	13	15	20	10	11	16	18	19	15	151
UNITED STATES	6	6	5	5	4	4	3	6	5	4	48
TOTAL FOREIGN	8	7	10	15	6	7	13	12	14	11	103
GERMANY	5	4	2	2	4	2	3	5	1	2	30
JAPAN		1	4	2		1	3	4	5	4	24
NETHERLANDS	1			5	1	1	1	2	2	2	15
SWITZERLAND			3	1		2	2		1	2	11
UNITED KINGDOM				1			3	1	3	1	9
FRANCE		1	1	2	1		1		1		7
ITALY	2	1		2		1			1		7



PATENT ACTIVITY - FISCAL YEARS 1965-1974



DISTILLATION IN THE PRESENCE OF INHIBITORS OR STABILIZERS

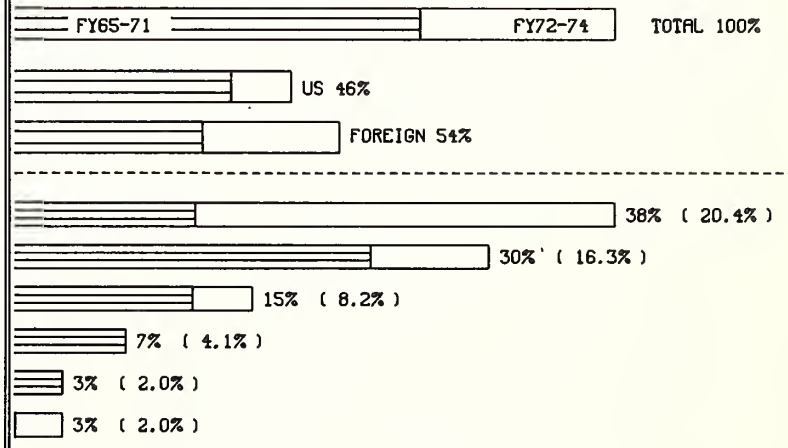
Distillation processes for separating liquid mixtures wherein a substance is added to the distilland or vapour to inhibit or prevent unwanted polymerization of the feed, vapour, residue or distillate. Typical of these processes is the distillation of vinylidene chloride from a vinylidene chloride-methyl chloroform mixture in the presence of hydrogen chloride. (Class 203, subclass 8)

FY72-74 Activity Indices

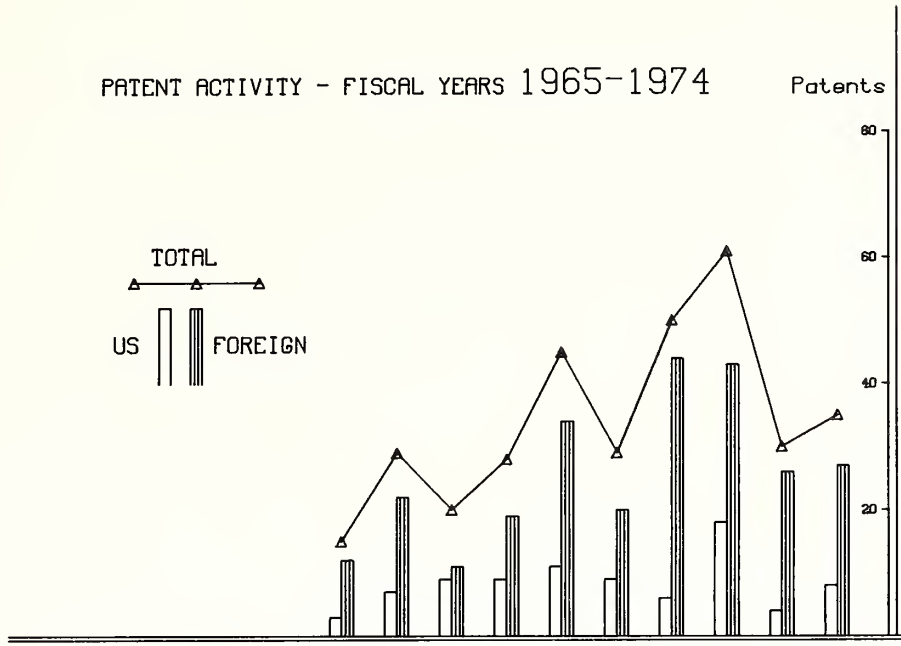
Average % Foreign 65.3% Average % Growth 5.5%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	5	3	4	4	10	2	5	2	8	6	49
UNITED STATES	3	3	3	1	4	2	2	1	3	1	23
TOTAL FOREIGN	2		1	3	6		3	1	5	5	26
JAPAN					3			1	3	3	10
GERMANY	2		1	2	1				1	1	8
UNITED KINGDOM				1			2			1	4
FRANCE					2						2
SWITZERLAND							1				1
NETHERLANDS									1		1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)



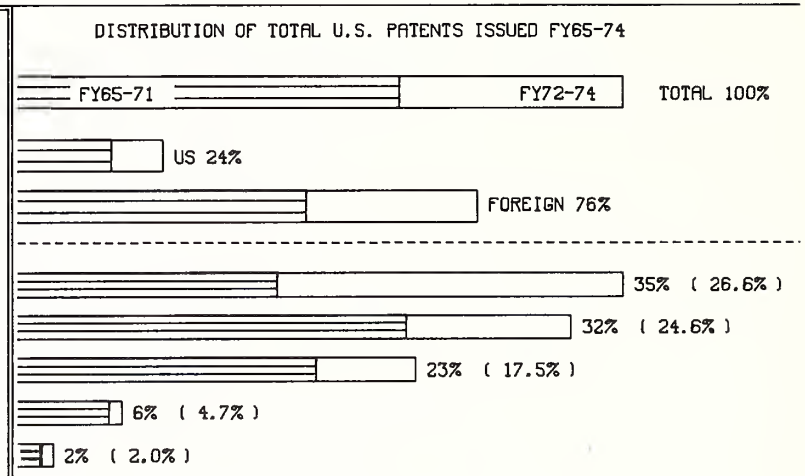
DYEING OF SKINS, HAIR, FUR OR FEATHERS

Processes and compositions for dyeing skins, hair, fur or feathers, and products of such processes. Most of the technology relates to dyeing of live human hair, e.g., with N-carbamoylethyl-aromatic amines or oxidation dyes, such as aminophenols. (Class 8, subclasses 10-13)

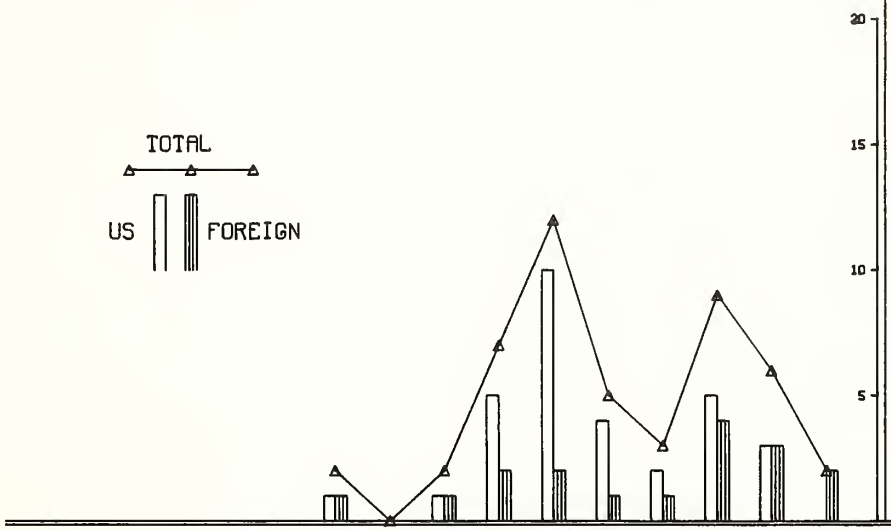
FY72-74 Activity Indices

Average % Foreign 76.2% Average % Growth 6.0%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	15	29	20	28	45	29	50	61	30	35	342
UNITED STATES	3	7	9	9	11	9	6	18	4	8	84
TOTAL FOREIGN	12	22	11	19	34	20	44	43	26	27	258
FRANCE	5	4	1	1	6	5	17	20	20	12	91
GERMANY	2	13	3	9	13	2	17	13	2	10	84
SWITZERLAND	4	3	4	4	11	10	9	7	3	5	60
UNITED KINGDOM	1	2	2	5	2	2		1	1		16
ALL OTHER (3)			1		2	1	1	2			7



PATENT ACTIVITY - FISCAL YEARS 1965-1974



PROCESSES FOR MAKING PORTLAND TYPE CEMENTS

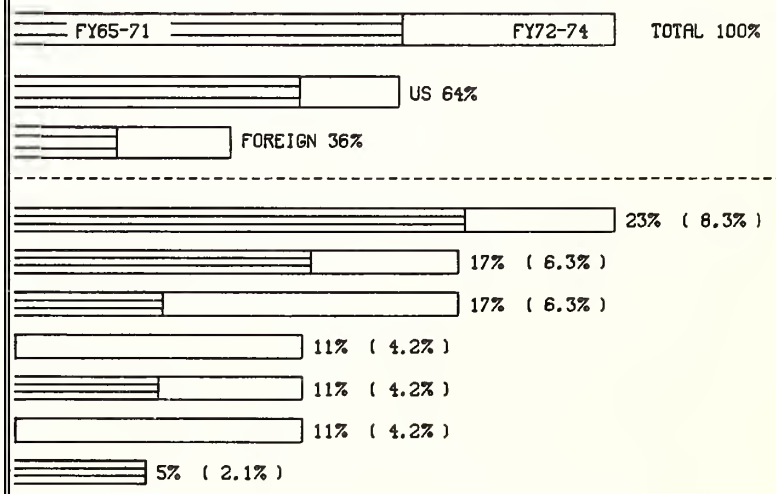
Processes for producing portland type cement by first clinkering (sintering or calcining) mixtures containing lime, silica, alumina and iron oxide, and then treating the resulting product in a significant manner (i. e., more than by mere grinding). Typical of the processes found here are 1) the addition of melamine aldehyde to a finely divided portland cement to increase its early strength characteristics and 2) the recycling of cement kiln dust to control the alkali content of the cement product. (Class 106, subclass 102)

FY72-74 Activity Indices

Average % Foreign 64.8% Average % Growth 5.4%

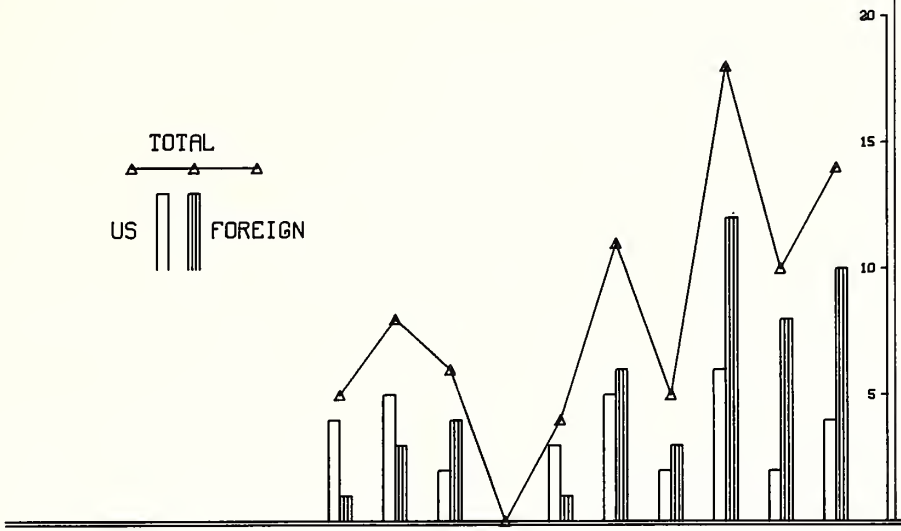
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2		2	7	12	5	3	9	6	2	48
UNITED STATES	1		1	5	10	4	2	5	3		31
TOTAL FOREIGN	1		1	2	2	1	1	4	3	2	17
GERMANY			1	1	1			1			4
DENMARK	1					1		1			3
FRANCE					1				1	1	3
JAPAN								2			2
CANADA							1		1		2
U.S.S.R.									1	1	2
SWITZERLAND				1							1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



PRODUCTION OF NICKEL OR COBALT METAL

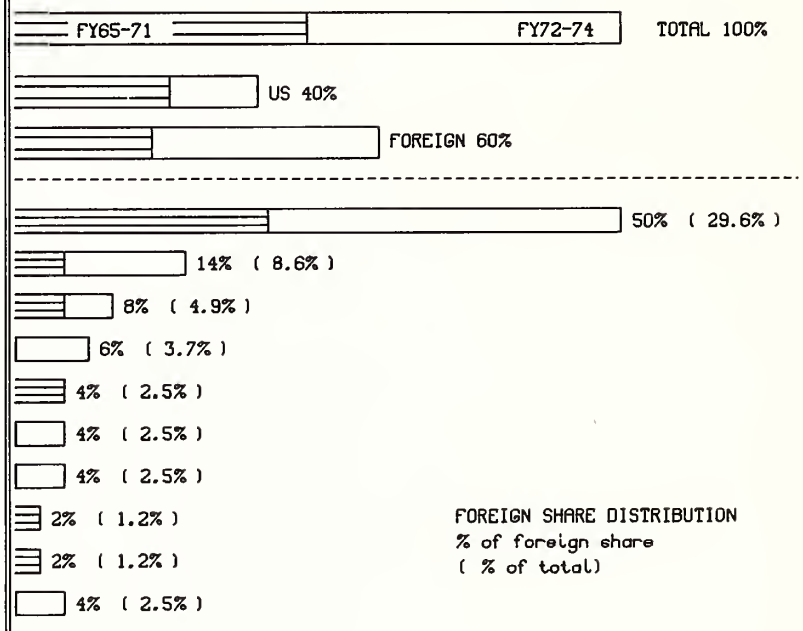
Processes for obtaining principally nickel or cobalt metal or alloy by reducing, melting or purifying nickel or cobalt ores by furnacing methods. Excluded are processes for beneficiating ores. Typical methods found here are reduction of nickel and cobalt oxides in a molten metal bath of controlled oxygen content and purification of nickel matte with regenerated molten halide extractant. (Class 75, subclass 82)

FY72-74 Activity Indices

Average % Foreign 72.7% Average % Growth 9.8%

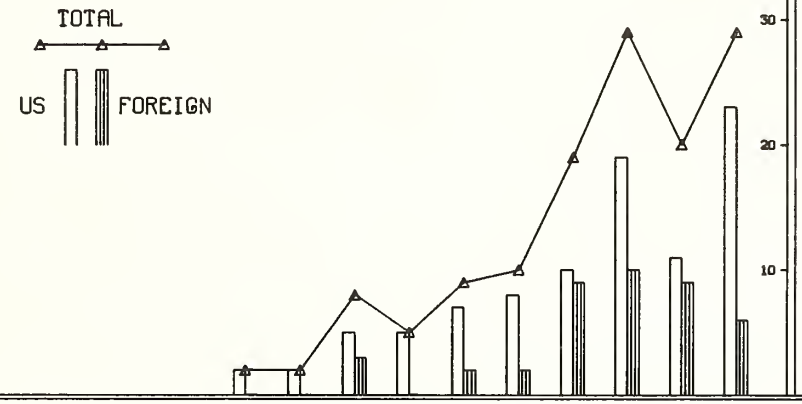
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	5	8	6		4	11	5	18	10	14	81
UNITED STATES	4	5	2		3	5	2	6	2	4	33
TOTAL FOREIGN	1	3	4		1	6	3	12	8	10	48
CANADA		1	2			4	3	7	2	5	24
JAPAN					1	1		1	3	1	7
GERMANY		1				1		1	1		4
FRANCE								2		1	3
AUSTRALIA			2								2
GREECE								1		1	2
ITALY									1	1	2
PHILIPPINES	1										1
POLAND		1									1
ALL OTHER (2)									1	1	2

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



SUBSTANTIALLY PURE CARBON PRODUCTS

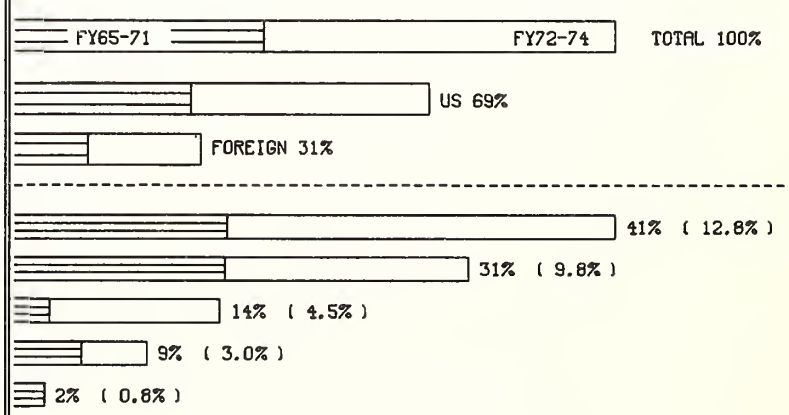
Substantially pure carbon, and its preparation, in the form of a fiber, fabric or textile. These products have varied uses, such as synthetic resin reinforcing materials, thermal insulation materials and fillers for electroconductive paints. The emphasis has been on preparative methods, typical of which is production of carbon filament from petroleum and coal pitches or by carbonization of rayon or polyacrylonitrile filament. (Class 423, subclass 447)

FY72-74 Activity Indices

Average % Foreign 32.1% Average % Growth 29.6%

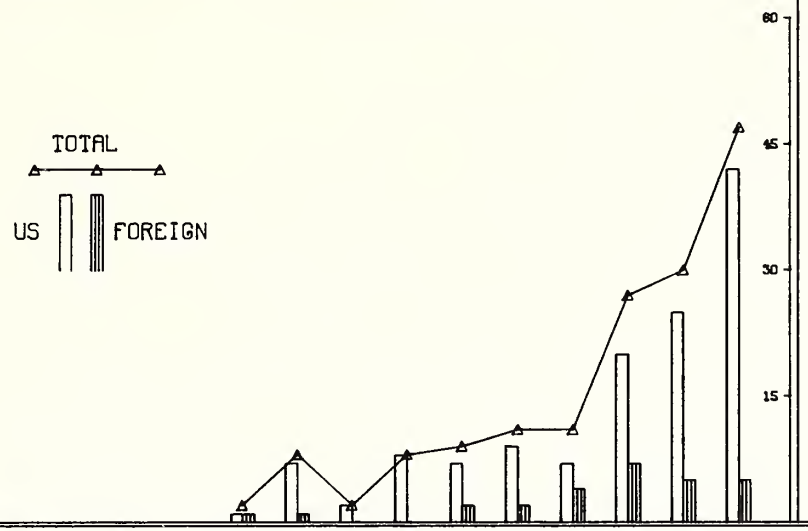
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	2	8	5	9	10	19	29	20	29	133
UNITED STATES	2	2	5	5	7	8	10	19	11	23	92
TOTAL FOREIGN			3		2	2	9	10	9	6	41
JAPAN			1		1	1	3	6	4	1	17
UNITED KINGDOM					1		5	3	2	2	13
GERMANY			1						3	2	6
FRANCE			1				1	1		1	4
CANADA						1					1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



CARDIAC PACEMAKERS

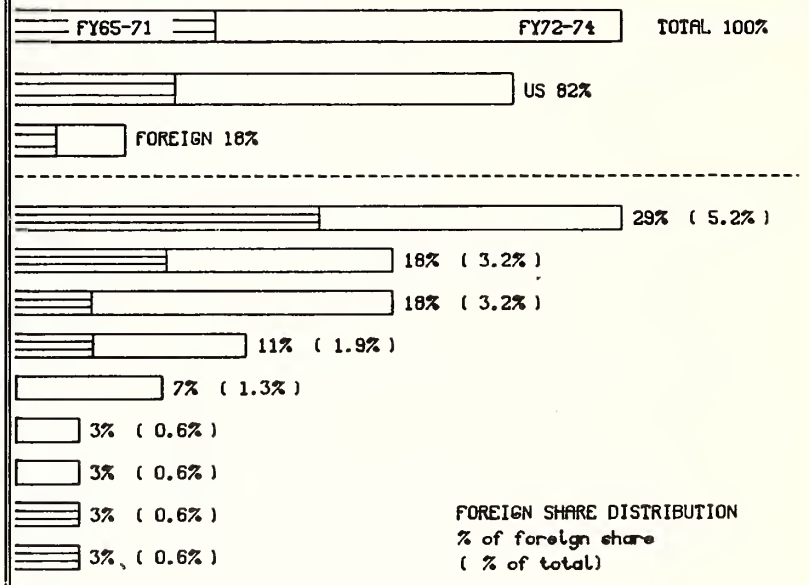
Cardiac stimulator devices for insertion into a living body. Included are programable pacemakers which can be monitored externally. Also included are devices for testing the overall performance of the heart pacer in situ with results telemetered to a central station for analysis. Among the various power sources utilized in pacemakers are lithium iodine batteries and nuclear batteries. "Bifocal" units, (i.e., single stimulator for two heart chambers), and miniaturizing of the pacemaker are active areas. (Class 128, subclass 419P)

FY72-74 Activity Indices

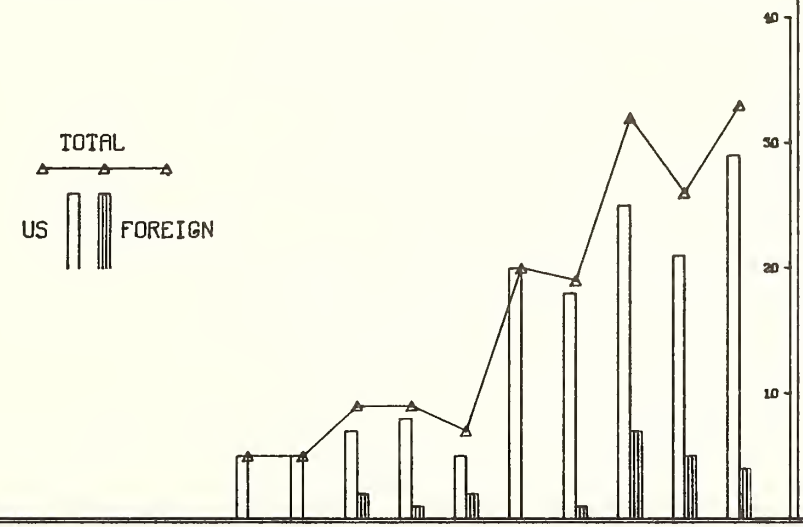
Average % Foreign 16.3%. Average % Growth 40.4%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	8	2	8	9	11	11	27	30	47	155
UNITED STATES	1	7	2	8	7	9	7	20	25	42	128
TOTAL FOREIGN	1	1			2	2	4	7	5	5	27
FRANCE		1				1	2	1	1	2	8
GERMANY	1					1		1		2	5
UNITED KINGDOM							1	2	2		5
DENMARK					1			1		1	3
POLAND								1	1		2
SWITZERLAND								1			1
NETHERLANDS									1		1
CANADA							1				1
ISRAEL					1						1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



FLUID COLLECTORS FOR DIAGNOSTICS

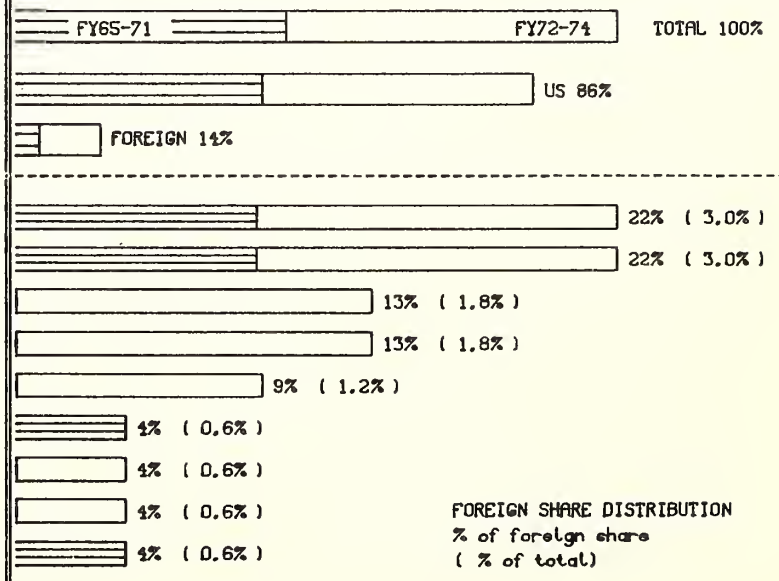
Techniques and instruments to collect any type of body fluid for diagnostics. These include taking blood samples with syringe devices which can collect and fill several vials with samples in one operation. Other fluid collectors and techniques feature the taking of bacteria free samples of body fluids. Recent emphasis has been on instruments that are disposable. (Class 128, subclass 2F)

FY72-74 Activity Indices

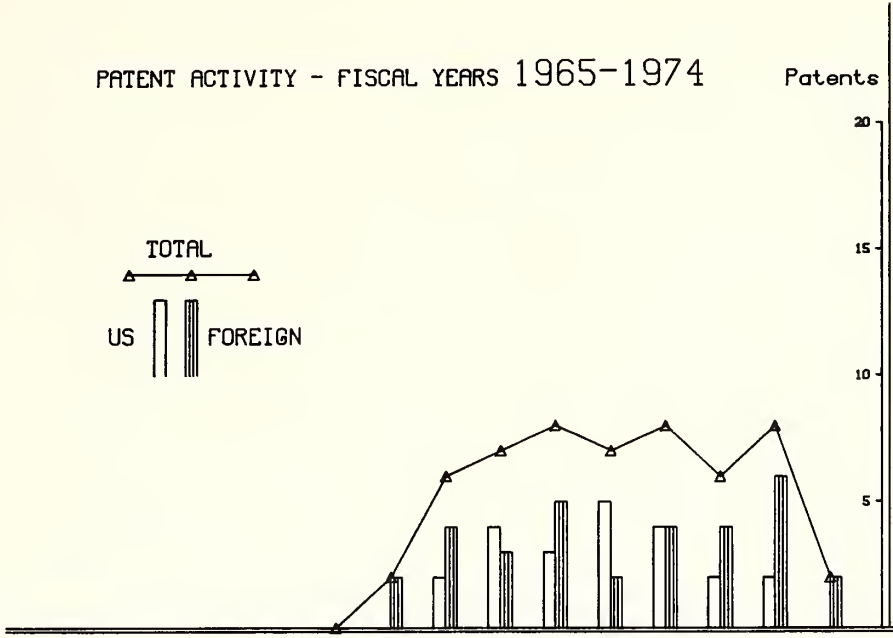
Average % Foreign 17.6% Average % Growth 24.8%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	5	5	9	9	7	20	19	32	26	33	165
UNITED STATES	5	5	7	8	5	20	18	25	21	29	143
TOTAL FOREIGN			2	1	2		1	7	5	4	22
UNITED KINGDOM			1	1					2	1	5
FRANCE					2			2	1		5
CANADA								2	1		3
SWITZERLAND								2	1		3
SWEDEN										2	2
URAGUAY			1								1
NETHERLANDS								1			1
BOLIVIA										1	1
U.S.S.R.							1				1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS		2	6	7	8	7	8	6	8	2	54
UNITED STATES			2	4	3	5	4	2	2		22
TOTAL FOREIGN		2	4	3	5	2	4	4	6	2	32
FRANCE			2		3	2	1	1	1	1	11
UNITED KINGDOM		1	1	1	1				1	3	8
JAPAN							2	1	2		5
BELGIUM			1	2			1	1			5
SWITZERLAND										1	1
CANADA					1						1
GERMANY		1									1

PRODUCTION OF FLAT GLASS

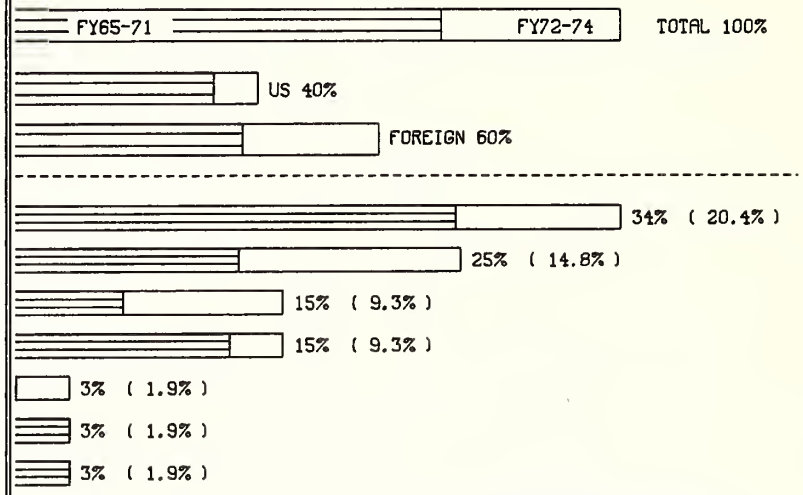
Processes for producing flat glass from molten glass which include applying a lateral force to the glass while it is being vertically drawn or formed on a molten metallic surface ("float glass"). These methods are intended to improve production speed, eliminate irregularities and maintain dimensional uniformity (e.g., width, thickness). (Class 65, subclass 91)

FY72-74 Activity Indices

Average % Foreign 80.6%

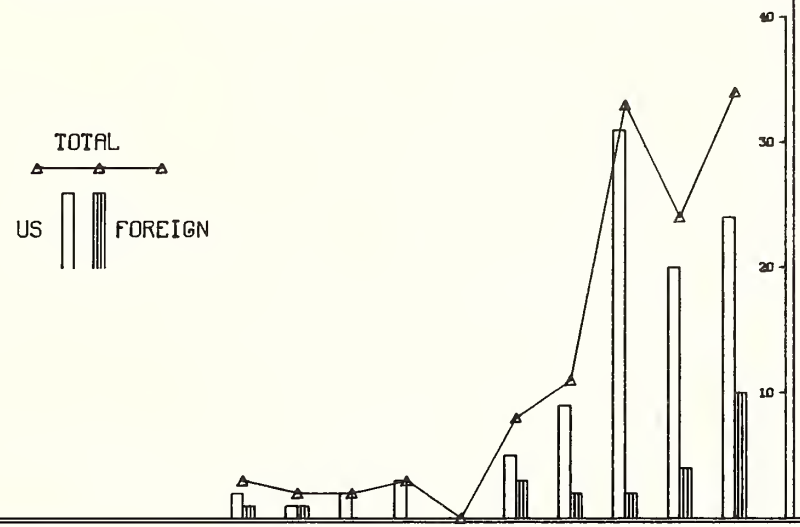
Average % Growth 5.5%

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



CONTROL OF OIL SPILLAGES IN BODIES OF WATER

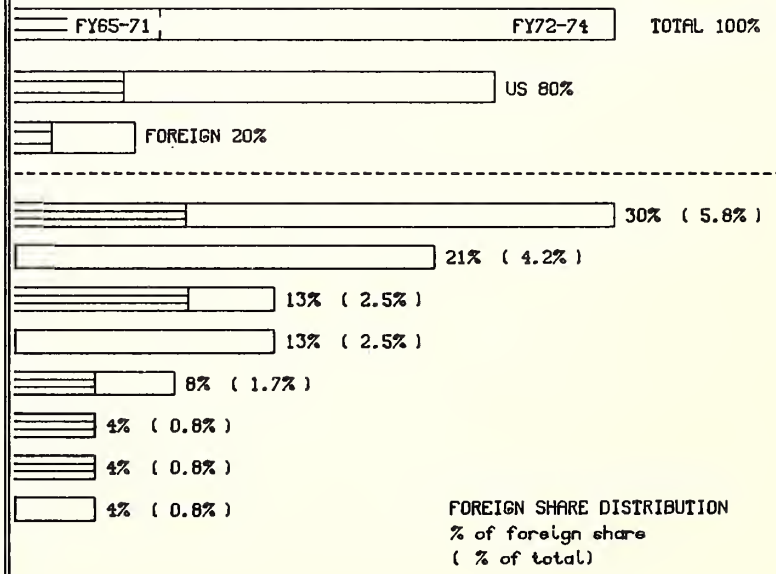
Floating barriers or boom structures, and methods for their use, for controlling floating oil slicks or other pollutants on bodies of water. The floating barrier, which is partly on the surface and partly submerged, confines the oil slick so that it can be easily picked-up or properly disposed of. (Class 61, subclass 1F)

FY72-74 Activity Indices

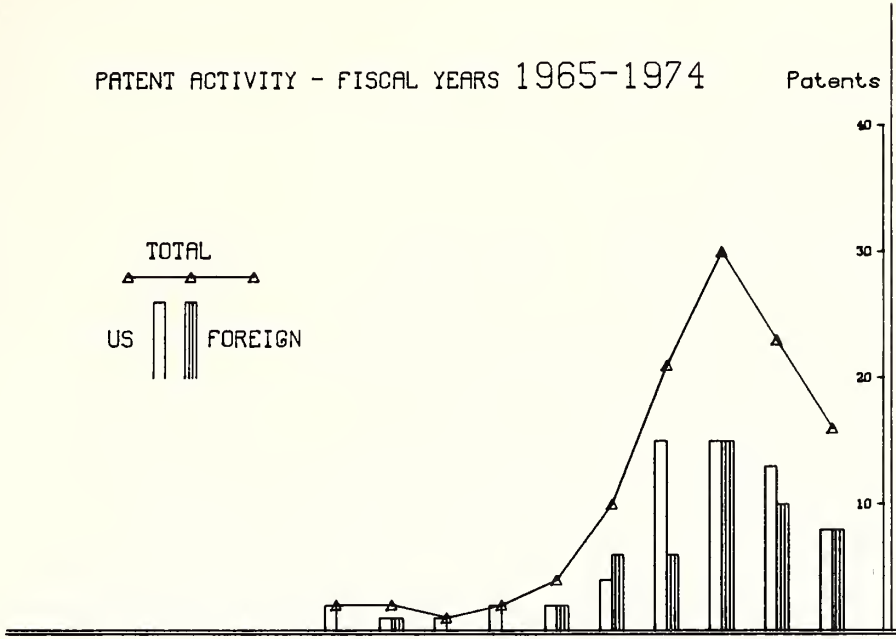
Average % Foreign 17.6% Average % Growth 50.8%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	2	2	3		8	11	33	24	34	120
UNITED STATES	2	1	2	3		5	9	31	20	24	97
TOTAL FOREIGN	1	1				3	2	2	4	10	23
FRANCE	1	1							2	3	7
SWEDEN								1	1	3	5
UNITED KINGDOM						2		1			3
JAPAN										3	3
CANADA							1		1		2
ITALY							1				1
NORWAY						1					1
AUSTRALIA										1	1

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



PATENT ACTIVITY - FISCAL YEARS 1965-1974



	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	2	2	1	2	4	10	21	30	23	16	111
UNITED STATES	2	1	1	2	2	4	15	15	13	8	63
TOTAL FOREIGN		1			2	6	6	15	10	8	48
CANADA		1			1	4	5	10	6	6	33
SWEDEN					1			5	3		9
GERMANY						2					2
FINLAND									1	1	2
CZECHOSLOVAKIA										1	1
ARGENTINA							1				1

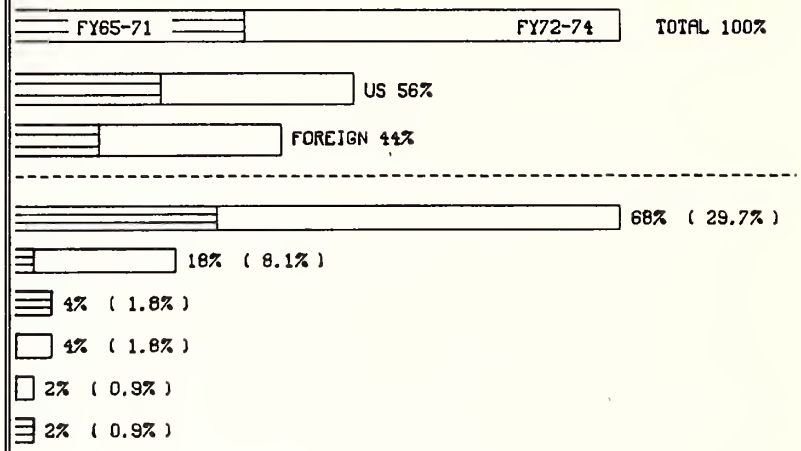
MACHINES FOR HARVESTING TREES

Tree harvesting machines that perform two or more sequential harvesting operations to produce a product (e.g., logs, chips) that can be easily handled for further processing. Included are machines that shear, delimb and debark trees, then load and haul the logs onto vehicles for transporting. Other machines, after harvesting the tree, reduce the logs into chips. Particularly active are techniques for felling trees (e.g., shearing and/or sawing). (Class 144, subclass 3D)

FY72-74 Activity Indices

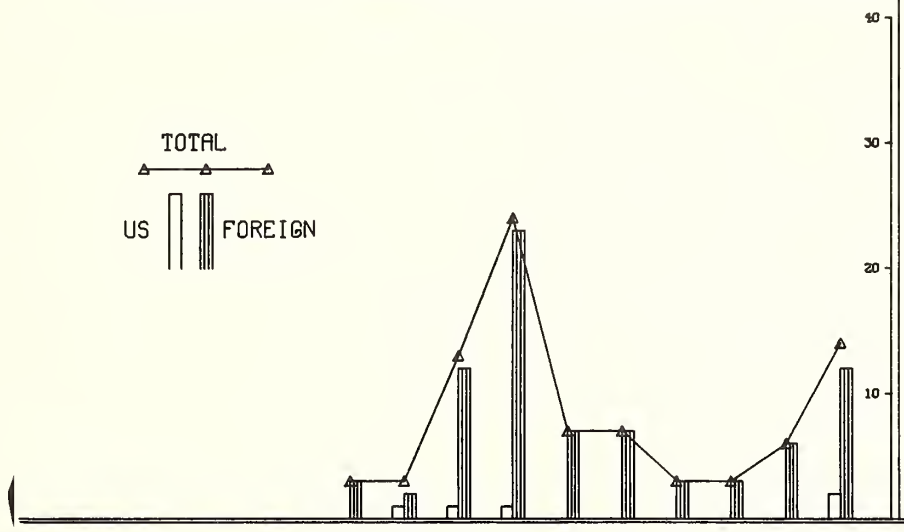
Average % Foreign 47.8% Average % Growth 33.1%.

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



MINERAL WINNING MACHINES

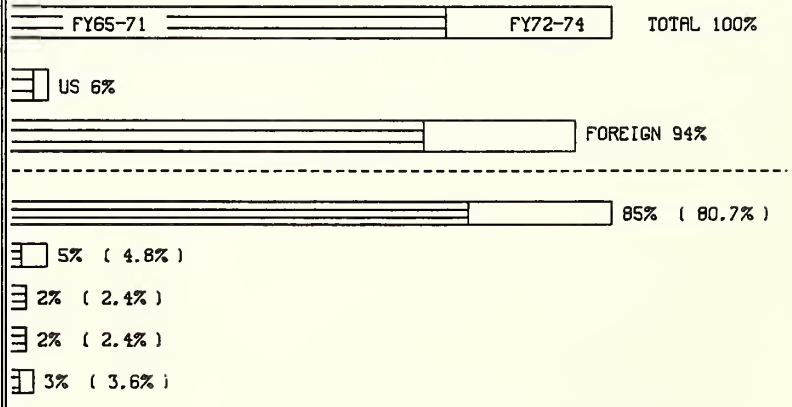
Mineral winning machines using a planer type cutter (e.g., flat blade, toothed plow) to cut, sever or break-up hard material (e.g., coal), layer by layer, along long wall mining operations. Most recent activity has involved toothed plow cutter apparatus which are reciprocally guided along the length of a conveyor extending parallel to a mine face. (Class 299, subclass 34)

FY72-74 Activity Indices

Average % Foreign 95.2% Average % Growth 6.0%

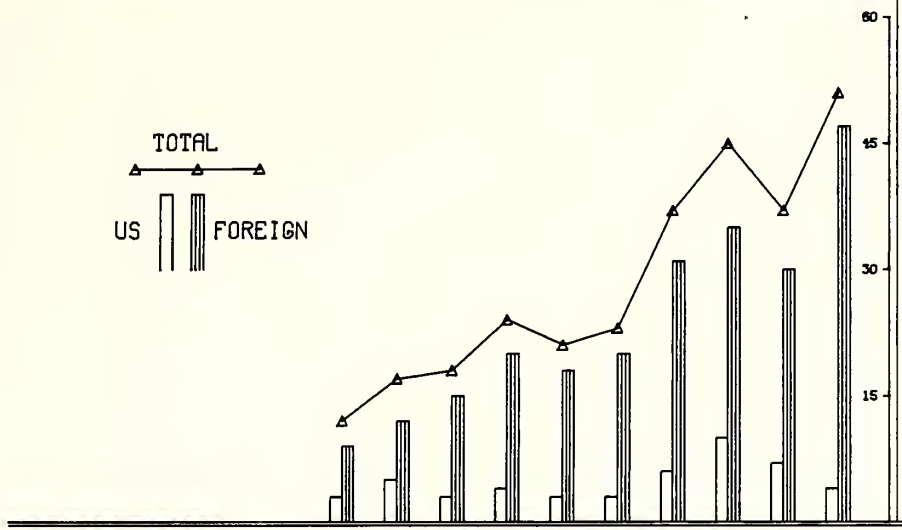
	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	3	3	13	24	7	7	3	3	6	14	83
UNITED STATES		1	1	1						2	5
TOTAL FOREIGN	3	2	12	23	7	7	3	3	6	12	78
GERMANY	3		10	23	7	7	1	3	3	10	67
UNITED KINGDOM		1							3		4
AUSTRALIA							2				2
NETHERLANDS		1	1								2
ALL OTHER (3)			1							2	3

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

PATENT ACTIVITY - FISCAL YEARS 1965-1974



SAFETY RELEASE SKI BINDINGS

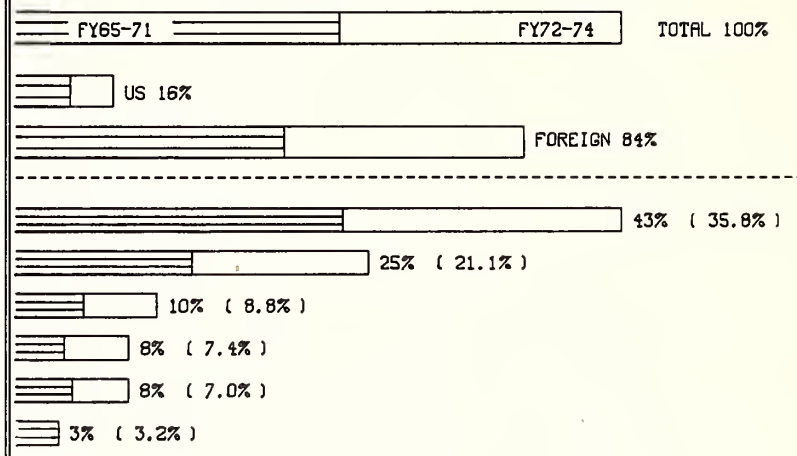
Ski boot-to-ski binding devices with safety release features. Heel release clamps react to vertical forces, while toe release clamps react to lateral forces. Particularly active are devices which react to either lateral or vertical forces beyond a predetermined value. Also active are devices for adjusting the release force mechanism with reliable accuracy and devices to prevent unauthorized tampering with the adjustment. (Class 280, subclass 11.35T)

FY72-74 Activity Indices

Average % Foreign 83.7% Average % Growth 17.7%

	FY65	66	67	68	69	70	71	72	73	74	TOTAL FY65-74
TOTAL PATENTS	12	17	18	24	21	23	37	45	37	51	285
UNITED STATES	3	5	3	4	3	3	6	10	7	4	48
TOTAL FOREIGN	9	12	15	20	18	20	31	35	30	47	237
GERMANY	4	5	6	8	8	11	13	16	15	16	102
FRANCE	1	2	6	5	4	3	9	9	7	14	60
JAPAN				3	3	2	4	1	4	8	25
AUSTRIA		1	1	2		3	2	5	4	3	21
SWITZERLAND	1	3	1		2	1	2	4		6	20
ALL OTHER (5)	3	1	1	2	1		1				9

DISTRIBUTION OF TOTAL U.S. PATENTS ISSUED FY65-74



FOREIGN SHARE DISTRIBUTION
% of foreign share
(% of total)

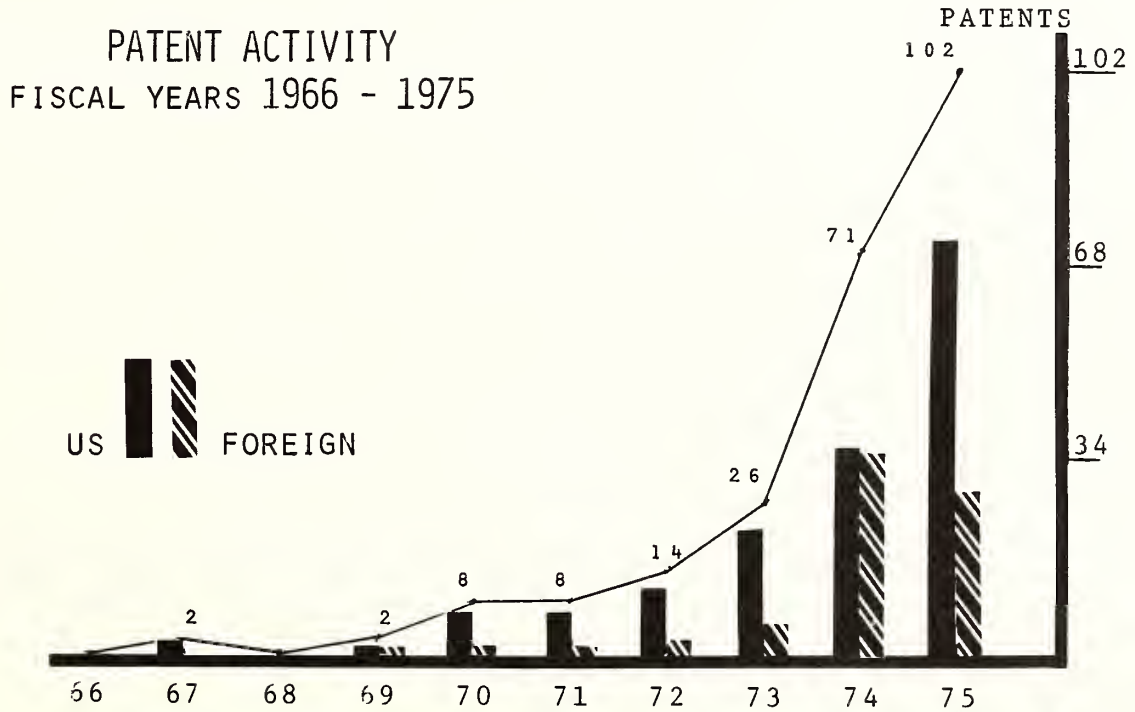
PROSTAGLANDINS[a]

Introduction

Prostaglandins are pharmacologically active lipids, widely distributed in animal and human tissue, which are among the most potent pharmaceutical agents known. They elicit multiple responses and have a broad spectrum of activity.

One or more of these compounds, in doses as small as about 10 ng/kg, (10 billionths of a gram per kilogram of recipient body weight), can affect the reproductive, cardiovascular, respiratory, nervous, renal, gastrointestinal, endocrine and/or metabolic systems, as well as the eyes, nose and skin. Hence, prostaglandins are useful in treating a wide variety of diseases, including, asthma, ulcers, and hypertension. In addition, they have uses as labor inducing, abortive and antifertility agents.

Due to this potency and broad spectrum of activity, this area has experienced phenomenal growth in recent years. Since 1971, patent activity in prostaglandins has been growing at an average annual rate of 84% which is about 34 times the average for all technologies. The following graph illustrates this growth.



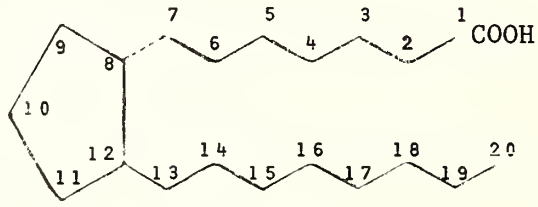
a. The technology reviewed in this report is substantially encompassed in U.S. Patent Classification System Class 260, subclasses 468D and 514D.

Since 1971, 34% of all prostaglandin patents have been granted to foreign resident inventors. This is slightly higher than the all technology foreign share average of 30% for the same period. As shown in the following "country table", Sweden is the most active of the foreign countries.

DISTRIBUTION OF PATENTS IN AREA OF INTEREST

	FY66	67	68	69	70	71	72	73	74	75	TOTAL FY66-75
TOTAL PATENTS		2		2	8	8	14	26	71	102	233
UNITED STATES		2		1	7	7	11	21	36	73	158
TOTAL FOREIGN				1	1	1	3	5	35	29	75
SWEDEN							2	2	17	4	25
CANADA				1	1		1	2	7	2	14
FRANCE								1	2	9	12
JAPAN									5	5	10
UNITED KINGDOM									3	7	10
NETHERLANDS						1					1
BELGIUM									1		1
MEXICO										1	1
ITALY										1	1

Structurally, the natural prostaglandins are 20 carbon unsaturated hydroxy acids having the following carbon skeleton,



with a hydroxy group at the 15 position. The more interesting compounds have a double bond at the 5 and/or 13 positions, an oxy or oxo group at position 9, a double bond at position 10 or an oxy group at position 11.

Thrust Of The Technology

Although first detected in the early 1900's, the initial work involving the isolation and identification of these substances was not completed until the late 1950's. Many of the natural prostaglandins were patented in "pure form" by the Bergstrom group in Sweden (1-5)[a].

The delay in developing prostaglandins was caused, in part, by a lack of an abundant source for these compounds. Wide-spread clinical use of these compounds has also been hampered by their rapid rate of metabolism and the lack of tissue specificity. Most of the research effort has focused on overcoming these problems.

Early methods for obtaining prostaglandins involved extraction of these compounds from mammalian tissues, such as sheep vesicular glands, swine lung and human seminal plasma. These provided only very small quantities of prostaglandins. Recently, an improved extraction process was developed for obtaining PGA_2[b] and certain esters thereof, from coral, specifically, plexaura homomalla (6, 7).

Extraction processes, however, do not economically provide the quantities of all prostaglandins needed. Even in the "improved" process mentioned above, 600 grams of coral are required to produce only 7 grams of product. As a result, most of the patent activity in this area focus on methods of synthesizing prostaglandins.

Early attempts to obtain prostaglandins, utilizing synthetic processes, employed the biosynthetic incubation of straight chain fatty acids. Methods of maximizing yields in these reactions were developed by groups at Upjohn (8, 9) in the United States and at Unilever (10) in the Netherlands. The Upjohn group aerobically incubated certain fatty acids with mammalian gland tissue or with Subphylum 2 of Phylum III. The Unilever group incubated cis polyenecarboxylic acids with mammalian gland tissue in the presence of glutathione.

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a. Numbers in parentheses refer to patents identified in the Bibliography at the end of this report.

b. Names are abbreviated using PG for prostanglandin, a letter symbol to indicate the particular substitution on the 5-membered ring, a subscript number to indicate the number of bonds in the side chains and subscripts α or β to indicate the configuration of the 9-hydroxy group. For example, the E prostaglandins have an oxygen at carbon 9 while the natural ocurring F prostaglandins have an α-hydroxy group at this position. The A prostaglandins have a 10-11 double bond.

Initial attempts at the complete chemical synthesis of the most potent prostaglandins were frustrated by the isomerism, arising from as many as five asymmetric centers and three double bonds, present in these compounds. The most active derivatives have specific configurations at each asymmetric carbon atom and double bond, so that highly stereoselective methods are needed.

Early chemical syntheses were developed in the United States (11), Canada (12), England (13), and Japan (14). The United States group prepared PGB_1 from o-methoxyphenylacetic acid in seventeen steps. The Canadian group prepared $PGF_{1\alpha}$ and $PGF_{1\beta}$ from cyclopentenol in about 12 steps. The Japanese employed eight steps to prepare PGF_1 from derivatives of cyclopentatrione. The English used enamine derivatives of cyclopentanone to prepare prostaglandin type compounds in eight steps. All of these syntheses, however, were tedious, gave low yields and often led to products which did not have the desired stereochemistry.

Since the late 1960's three chemical syntheses leading to stereospecific prostaglandins have been developed in the United States. These processes, described in the literature and recently reviewed (15), provide large quantities of prostaglandins and their analogues and essentially overcome the supply problem. Variations of these processes utilize tricyclic ketone intermediates (16), 7-[2-β-hydroxymethyl-3α-(tetrahydropyran-2-yloxy)-5-acetoxycyclopent-1α-yl] heptanoate intermediates (17) and the conversion of 3-oxo-1-iodo-1-trans-octene to 3(S or R)-hydroxy-1-iodo-1-trans-octene via fermentation with ascomycetes, phycomycetes or fungi imperfecti (18).

Recently, synthetic paths have been developed to convert PGA_2 into the other naturally occurring prostaglandins (19) and into various novel synthetic derivatives by adding across the 10-11 double bond (20, 21).

Approaches to solve the problems of rapid metabolism and the lack of tissue specificity focus, for the most part, on altering the structure of naturally occuring prostaglandins to obtain more useful analogues. Numerous modifications have been patented.

One of the first of these, originating in the Netherlands (10), involved alteration of the C-20 chain length to C-18 or C-22. Another modification was the development of the 11-deoxy derivatives-a valuable group of compounds. 11-deoxy PGE_1 and 11-deoxy PGF_1 were developed very early in the United States (22) and Canada (23), respectively. More recently, 11-deoxy PGE_2 was synthesized in France (24). Many other variations employ the 11-deoxy modification (25-27). 9 and/or 15 deoxy derivatives have also been patented (27-32).

A different approach to altering the activity of natural prostaglandins involved the substitution of additional groups into the basic structure. Insertion

of oxygen (33), sulfur (25), phenylene (33)[a], and alicyclic rings (26) into one of the side chains has lead to valuable compounds. Other substitutions include replacing the 11- (34) or 15-hydroxy (35) with lower alkoxy groups, converting double bonds to cyclopropyl groups (36), and the addition of numerous substituents such as nitromethyl, phenyl[a], cyano[b], and phenylthio[c] in the 11-position of 11 deoxy PGE_2 (21).

Many new analogues have been produced by altering the stereochemistry of known compounds including the nature and position of the olefinic groups. Examples are the inversion of configuration at the 8-(37) and 15-(38) positions; alteration of 5-6 cis and 13-trans to 5-6 trans (34) and 13-cis (40), respectively; and, the preparation of 4, 5-allenic (41), 13-ethynylenic (42) 11-12 olefinic (43), 9-hydroxy-11 - oxo (44), 13-hydroxy -14-ene (45) and 11-hydroxy - 9-ene (46) containing compounds.

Various derivatives of the acid and/or hydroxy groups have also been made. These include numerous amine salts (47), glyceride and phosphatide esters (48), and clathrates and numerous organic esters (49). Recently, selectively acylated prostaglandins have also been prepared (50).

One of the most important modifications, developed in the United States (51-54), Canada (27), and Japan (55), appears to be 15 and 16 alkylation. Compounds containing 15 and 16 alkyl groups are metabolized more slowly and show more specific activity than their naturally occurring counterparts. Two known analogues of this type are 15-methyl PGE_2, an antifertility agent, and 16, 16-dimethyl PGE_2, an anti-ulcer agent.

Much of the recent effort in the technology involves development of compounds which alter more than a single site of the naturally occurring prostanglandins by using some of the above methods, especially alkylation in the 15- and/or 16-positions.

Technology Analysis by
Robert Gerstl, Ph. D.
Patent Examiner

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a. Compounds containing this substituent are separately classified in Class 260, subclasses 473, 520.

b. Compounds containing this substituent are separately classified in Class 260, subclass 465.

c. Compounds containing this substituent are separately classified in Class 260, subclasses 470, 516.

PROSTAGLANDINS - BIBLIOGRAPHY[a]

	PATENT NO.	INVENTOR	ASSIGNEE	COUNTRY
1.	3069322	Bergstrom et al.	none	Sweden
2.	3706789	Bergstrom et al.	none	Sweden
3.	3839409	Bergstrom et al.	none	Sweden
4.	3598858	Bergstrom et al.	none	Sweden
5.	3657316	Samuelsson	none	Sweden
6.	3794675	Hamilton et al	The Upjohn Co.	USA
7.	3875214	Schneider	The Upjohn Co.	USA
8.	3290226	Beal III et al.	The Upjohn Co.	USA
9.	3296091	Beal III et al.	The Upjohn Co.	USA
10.	3579425	Van Dorp et al.	Unilever N. V.	Netherlands
11.	3644502	Morin et al.	Eli Lilly & Co.	USA
12.	3784636	Just et al.	Just	Canada
13.	3880883	Caton et al.	May & Baker Ltd.	England
14.	3832380	Matsui et al..	Sumitomo Chem. Co.	Japan
15.	Bartmann, Angew. Chem. Internation, Edit. Vol. 14 (1975) No. 5 pp. 337-344			
16.	3873571	Kelly	The Upjohn Co.	USA
17.	3887587	Schaaf et al.	Pfizer Co.	USA
18.	3868306	Sih	Wisconsin Alum. Res.	USA
19.	3880912	Pike et al.	The Upjohn Co.	USA
20.	3839430	Lemming et al.	Amer. Home Prod. Corp.	England
21.	3845042	Strike et al.	Amer. Home Prod. Corp.	USA
22.	3725454	Beal III et al.	The Upjohn Co.	USA
23.	3455992	Bagli et al.	Amer. Home Prod. Corp.	Canada
24.	3801623	Martel et al.	Roussel-UCLAF	France
25.	3873607	Bernady et al.	Amer. Cyanamid Co.	USA
26.	3884969	Schaub et al.	Amer. Cyanamid Co.	USA
27.	3671570	Bagli et al.	Ayerst McKenna & Harrison Ltd.	Canada
28.	3872139	Patterson et al.	Syntex, Inc.	USA
29.	3842117	Sakai et al.	Sankyo Co.	Japan
30.	3678092	Finch	Ciba-Geigy Corp.	USA
31.	3845096	Caton et al.	May & Baker Ltd.	England
32.	3846475	Crabbe et al.	Syntex Inc.	Mexico
33.	3864387	Nelson	The Upjohn Co.	USA
34.	3876690	Floyd et al.	Amer. Cyanamid Co.	USA
35.	3853950	Lincoln et al.	The Upjohn Co.	USA
36.	3867423	Crabbe	Syntex Inc.	France

a. Includes patents through June 1975 available to the patent examiner at the time this report was prepared.

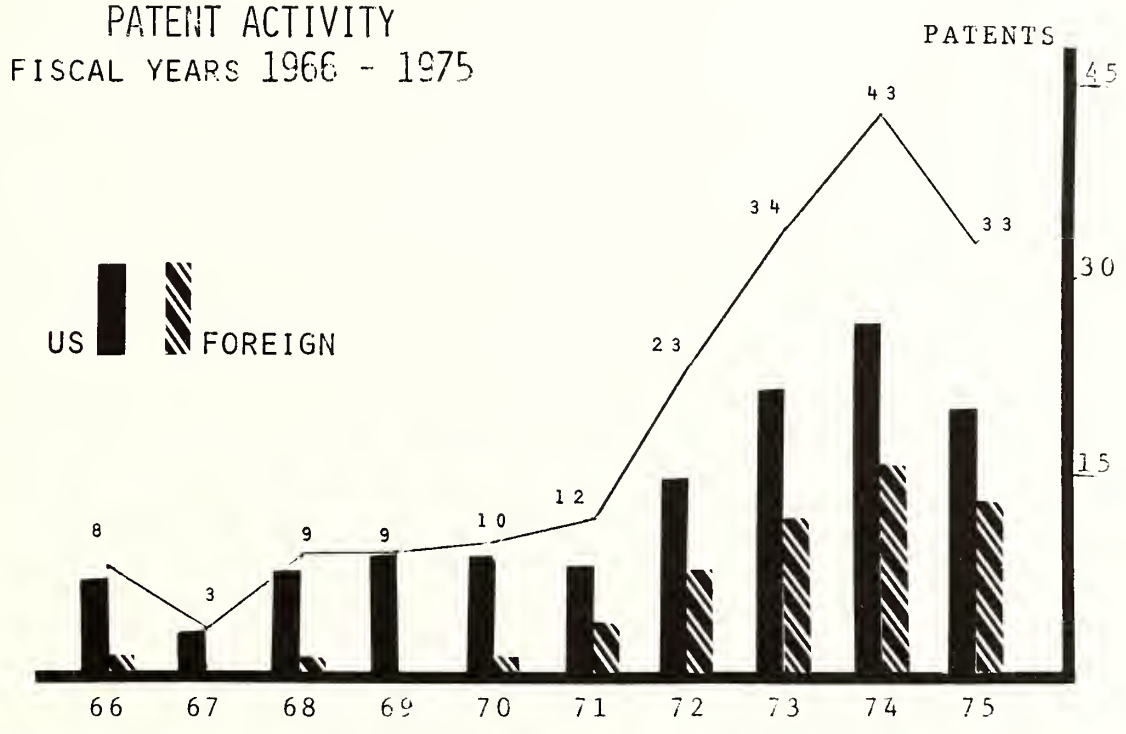
37. 3847966	Pike	The Upjohn Co.	USA
38. 3639463	Pike et al.	The Upjohn Co.	USA
39. 3832379	Lincoln et al.	The Upjohn Co.	USA
40. 3867377	Kluge et al.	Syntex, Inc.	USA
41. 3879438	Crabbe et al.	Syntex, Inc.	France
42. 3868413	Pappo et al.	Searle & Co.	USA
43. 3872149	Crabbe	Syntex. Inc.	France
44. 3767813	Samuelsson	none	Sweden
45. 3880906	Spraggins	Alza Corp.	USA
46. 3862979	Gandolfi et al.	none	Italy
47. 3845111	Zaffaroni	Alza Corp.	USA
48. 3632627	Gordon et al.	Smith, Kline & French	USA
49. 3821279	Kurono et al.	Ono Pharmaceutical Co.	Japan
50. 3853963	Morozowich	The Upjohn Co.	USA
51. 3855270	Pike et al.	The Upjohn Co.	USA
52. 3849487	Bundy	The Upjohn Co.	USA
53. 3728382	Bundy	The Upjohn Co.	USA
54. 3514383	Beal III et al.	The Upjohn Co.	USA
55. 3878239	Hayashi et al.	Ono Pharmaceutical Co.	Japan

COLOR ELECTROPHOTOGRAPHY[a]

Introduction

Xerography, widely used in the Xerox (Trademark) copier, is the best known electrophotographic method. First developed in the late 1930's, this technology, in its black and white embodiment, began experiencing rapid growth in the 1950's.

Electrophotographic processes which produce natural color copies emerged in 1942, only slightly after the beginnings of black and white electrophotography. However, commercial use of color copying occurred only recently. This technology started growing rapidly in 1971 and has averaged a 25% increase in each of the years that followed. This growth, which is about 10 times the average for all technologies combined, is illustrated in the following graph.



a. The technology reviewed in this report is encompassed in U.S. Patent Classification System Class 96, subclass 1.2.

Since 1971, the foreign contribution to this technology's growth has amounted to about 37% of all patents issued, somewhat higher than the all technology foreign share average of about 30% for the same period. The following "country table" indicates the distribution of the patents which have issued in this area over the last ten fiscal years.

DISTRIBUTION OF PATENTS IN AREA OF INTEREST

	FY66	67	68	69	70	71	72	73	74	75	TOTAL FY66-75
TOTAL PATENTS	8	3	9	9	10	12	23	34	43	33	184
UNITED STATES	7	3	8	9	9	8	15	22	27	20	128
TOTAL FOREIGN	1		1		1	4	8	12	16	13	56
JAPAN	1					2	7	11	10	12	43
AUSTRALIA			1			1	1			1	4
GERMANY					1	1			1		3
SWITZERLAND									2		2
UNITED KINGDOM									2		2
FRANCE								1			1
BELGIUM									1		1

Thrust Of The Technology

Color electrophotographic processes in general relate to the use of electrical fields to form natural color pictures on photoconductive or electrically photosensitive materials. These materials are imagewise exposed to a natural color original and developed to form a natural color picture.

One of the earliest processes of color electrophotography was developed by Carlson in 1942 (1)[a]. His process successively formed red, green, and blue separation electrostatic images on a panchromatic photoconductor. These images were successively developed by cyan, magenta and yellow toners, if the charged areas were to be developed, or by red, green and blue toners, if the uncharged areas were to be developed. The developed images were then successively transferred in register to a receiver sheet forming a natural color toner picture.

a. Numbers in parentheses refer to patents cited in the Bibliography at the end of this report.

Nearly 20 years after the Carlson patent, two additional processes emerged in quick succession.

In 1961, Kaprelian (2) patented a process using three separate photoconductive drums to form the color separation images discussed above. These were developed with colored toner. The toner was then transferred in register to a receiver sheet to form a natural color toner picture.

Greig (3) in 1962, developed a process which avoids registration and transfer problems by forming the natural color toner image directly on a photoconductive sheet. This is achieved by successively depositing colored toner in response to the color separation electrostatic images on the photoconductive sheet. The deposited colored toner is overprinted and fixed to the photoconductive sheet to form a natural color toner picture.

A number of important variations of the Carlson, Kaprelian and Greig processes have been developed.

Gaynor (4) patented a tricolor screen and a photoconductive material containing a plastic overlayer which deforms in response to an imagewise electrostatic charge and allows a natural color image to be projected therethrough.

Miller et al. (5) developed a simplified process employing a photoconductive member containing a mosaic of dots each sensitive to either red, green or blue light. This allowed one step color processing by removing color from dots in image exposed areas.

Meyer et al (6) patented another way of developing images. He employs a photoconductographic deposition technique using a dye solution electrolytically deposited on an imagewise exposed photoconductive sheet.

In an alternative approach, Pressman et al. (7, 8) used screens coated with photoconductive materials either uniformly electrostatically charged or subjected to an electrical field. Upon imagewise exposure to light these screens allowed toner or charged ions to pass through.

Poor picture quality, arising from a difference in the electrophotographic properties of photoconductive coatings in the image and nonimage areas, was overcome by Tamai (9) and Sato et al (10). They employ a dye absorbing toner material in the photoconductive coating. The absorbed dye is transferred imagewise to a receiver sheet or to a dye absorbing photoconductive layer upon which a nonabsorbing toner image is formed.

Smith et al, (11) avoided the problem of using highly colored and imperfect dyes by using separate colorless reagents in the toner material and in the photoconductive layer or receiver sheet. These react with one another on contact to produce a color image.

Other patented variations attempt to improve picture color quality by manipulation of the electrostatic charge, the amount or intensity of light, or the

amount of colored toner deposited in the image areas, and by the use of color standards for calibrating multi-color electrophotographic machines (12-21).

Recently, the electrophotographic method known as photoelectrophoresis, exemplified by Tulagin et al. (22), was developed. This process greatly simplifies earlier methods and is used in the majority of color electrophotography patents.

Photoelectrophoresis methods employ an insulating liquid carrying a suspension of cyan, magenta and yellow electrically photosensitive particles. The insulating liquid is spread between a conductive "injecting" electrode and a "blocking" electrode having an electrically insulating overlayer. An electrical field is generated between the electrodes and the suspension is exposed to a natural color picture. Electrically photosensitive particles, sensitive to the particular wavelengths of light in the exposure step, migrate to the blocking electrode to form a natural color picture on the blocking electrode.

Manifold (23) and migration (24) imaging are two other color processes which simplify earlier methods. In manifold imaging a binder layer carrying electrically photosensitive particles is placed between two supports. The binder layer is softened by solvent or heat, placed under an electrical field and imagewise exposed to light. The supports are then separated causing pieces of binder and electrically photosensitive material to preferentially adhere to one of the two supports. In migration imaging, electrically photosensitive material in a binder is uniformly electrostatically charged and imagewise exposed. The binder is then softened to allow selective imagewise migration of the electrically photosensitive material.

Current patent activity seems to be directed toward improving image color fidelity:

- in conventional electrophotographic process, for example, by varying electrostatic charging and exposure techniques; and

- in photoelectrophoresis, for example, by
  - color masking,
  - use of particle additives,
  - removal of selected wavelengths of electromagnetic radiation from the imagewise exposed illumination,
  - adjustment of the sizes of electrically photosensitive particles,
  - varying the electrostatic charge on the suspension, and
  - use of ultrasonic vibration during imaging.

Technological analysis by
Roland E. Martin, Jr.
Patent Examiner

COLOR ELECTROPHOTOGRAPHY - BIBLIOGRAPHY[a]

PATENT NO.	INVENTOR	ASSIGNEE	COUNTRY
Patents cited in text:			
1. 2297691	Carlson	none	USA
2. 2986466	Kaprelian	none	USA
3. 3060021	Greig	Radio Corp. of Am.	USA
4. 3413117	Gaynor	GE Corp.	USA
5. 3212887	Miller et al.	Minnesota Mining & Mfg. Co.	USA
6. 3130655	Meyer et al.	Minnesota Mining & Mfg. Co.	USA
7. 3697164	Pressman et al.	Electroprint Inc.	USA
8. 3809557	Pressman et al.	Electroprint Inc.	USA
9. 3864125	Tamai	Xerox Corp.	Japan
10. 3681065	Sato et al.	none	Japan
11. 3253913	Smith et al.	Eastman Kodak Co.	USA
12. 3043686	Bickmore	Xerox Corp.	USA
13. 3615391	Honjo et al.	Fuji Photo Film Co.	Japan
14. 3620722	Hastnell et al.	Australia	Australia
15. 3672887	Matsumoto et al.	Xerox Corp.	Japan
16. 3785812	Matsumoto	Fuji Photo Film Co.	Japan
17. 3799668	McVeigh	Xerox Corp.	USA
18. 3692519	Takahaski	Canon Kabushki Kaisha	Japan
19. 3799774	Matsumoto	Xerox Corp.	Japan
20. 3844783	Matsumoto et al.	Fuji Photo Film Co.	Japan
21. 3884686	Bean	Xerox Corp.	USA
22. 3384565	Tulagin et al.	Xerox Corp.	USA
23. 3512968	Tulagin	Xerox Corp.	USA
24. 3873309	Goffe	Xerox Corp.	USA
Other Patents Listed by Categories:			
Photoelectrophoresis			
3448025	Kreiger et al.	Xerox Corp.	USA
3485738	Carreira	Xerox Corp.	USA
3551313	Walsh	Xerox Corp.	USA
3553093	Putnam et al.	Xerox Corp.	USA
3595770	Luebbe et al.	Xerox Corp.	USA
3586615	Carreira	Xerox Corp.	USA
3595771	Weigl	Xerox Corp.	USA
3607256	Silverberg	Xerox Corp.	USA
3616395	Carreira et al.	Xerox Corp.	USA
3645874	Wells	Xerox Corp.	USA
3676313	Ciccarelli	Xerox Corp.	USA
3681064	Yeh	Xerox Corp.	USA
3681221	Snelling	Xerox Corp.	USA
3682628	Gundlach	Xerox Corp.	USA

a. Includes patents through June of 1975 available to the Examiner at the time this report was prepared

Other Patents Listed by Categories (cont.):

Photoelectrophoresis (cont.)			
3708286	Davies	Xerox Corp.	USA
3715209	Gundlach	Xerox Corp.	USA
3745003	Moradzadeh	IBM Corp.	USA
3748035	Mannik	Xerox Corp.	USA
3767392	Ota	Matsushita Elec. Indus. Co.	Japan
3772013	Wells	Xerox Corp.	USA
3775107	Tulagin et al.	Xerox Corp.	USA
3782932	Tulagin	Xerox Gorp.	USA
3810758	Tulagin et al.	Xerox Corp.	USA
3849132	Wells et al.	Xerox Corp.	USA
3870517	Ota et al.	Matsushita Elec. Indus. Co.	Japan
3881920	Carreira et al.	Xerox Corp.	USA
Dye Absorbing Toner or Layer			
3357830	Bixby	Xerox Corp.	USA
3615390	Sprague	Itek Corp.	USA
3630729	Bach et al.	A. B. Dick Co.	USA
3772053	Eastman et al.	Eastman Kodak Co.	USA
3788845	Osawa et al.	Fuji Photo. Film Co.	Japan
Color Forming Reagents in Toner and Layer			
3386379	Gundlach et al.	Xerox Corp.	USA
3840385	Yoskida	Ricoh Co.	Japan
3879196	Nagashima et al.	Canon Kabushiki Kaisha	Japan
3880656	Nagashima et al.	Canon Kabushiki Kaisha	Japan
Screens Coated with Photoconductor			
3532422	McFarlane	Electroprint Inc.	USA
Color Electrolysis			
3226307	Tokumoto	Sony Corp.	Japan
3420662	Meyer et al.	Minnesota Mining & Mfg. Co.	USA
Manifold Color Process			
3556783	Kyriakakia	Xerox Corp.	USA
3853555	Reinis et al.	Xerox Corp.	USA
Mosaic Photoconductive Dots			
3748125	Hercock et al.	Ilford Ltd.	England
Migration Color Process			
3723113	Goffe	Xerox Corp.	USA

GAS LASERS [a]

Introduction

In 1958, Charles H. Townes and Arthur L. Schawlow jointly proposed a system in which atoms of a metallic vapor could be pumped to excited states and stimulated to emit light radiation (1) [b]. Shortly thereafter, in July 1960, a new and unique light was first produced by Theodore H. Maiman using a small cylinder of pink synthetic ruby (2). This was the birth of an entirely new technology for producing and using this light, called laser [c] light, from devices called lasers.

Laser light is unlike any other light previously known in being highly coherent, i.e., it exhibits small divergence, monochromaticity (single wavelength) and uniform frequency, phase, amplitude, and direction. These highly desirable characteristics make this light useful for a variety of engineering and biological applications.

Laser light, because of its coherency and high frequency, has great potential use in the communication field as a transmitting medium for phone and television signals. A common gas laser beam (helium-neon) can, in theory, carry as many as ten million simultaneous phone calls or eight thousand simultaneous television programs. Other engineering applications include use in tracking and ranging systems, surveying, mechanical measurements (earth movement, building sway, machine tool control, etc.), welding and cutting, and holography.

Laser beams are fast replacing conventional needle like probes and xenon photocoagulators in the welding of detached retinas. Medical uses of lasers also include skin and cosmetic repair, transillumination, neurosurgery, and density and cell identification.[d]

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a. The technology reviewed in this report is encompassed in U.S. Patent Classification System Class 331, subclass 94.5G

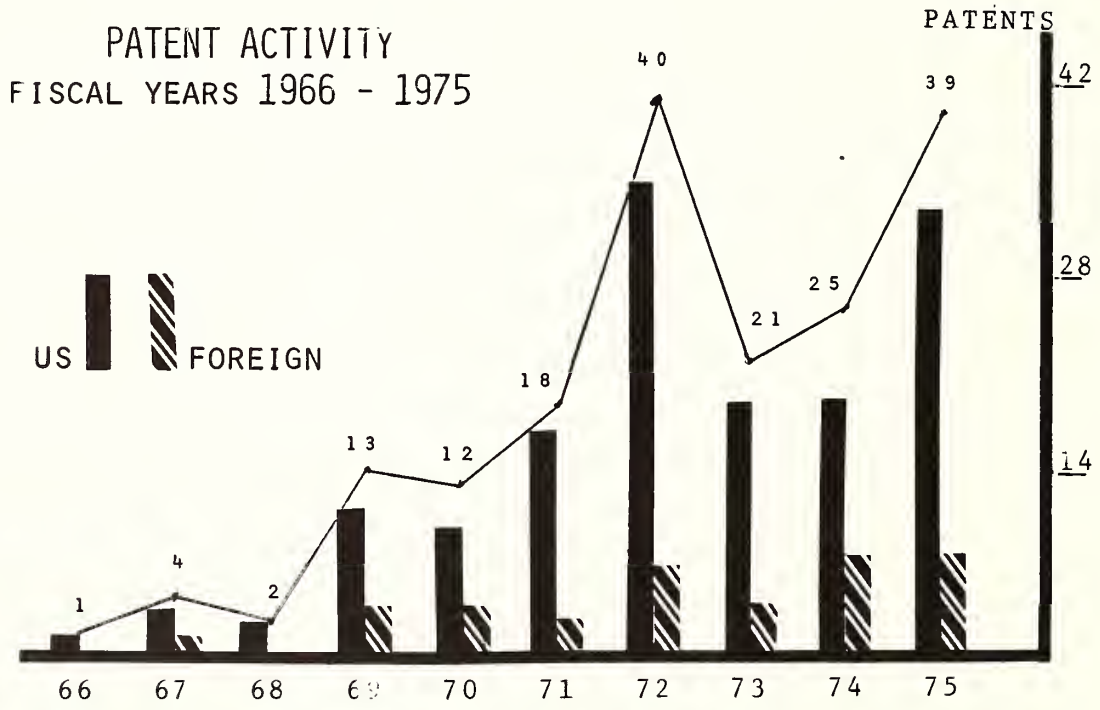
b. Numbers in parentheses refer to patents cited in the Bibliography at the end of this report.

c. Laser is an acronym standing for "Light Amplification by Stimulated Emission of Radiation"

d. From Van Pelt et al. "Laser Fundamentals and Experiments", U.S. Department of Health, Education and Welfare, SWRHL (1970)

Gas lasers, the most common in use today, employ a gas medium to amplify light. The gas system is excited by various means, such as an electrical discharge passing through the gas. Laser light is produced when this gas system de-excites spontaneously. With continuous excitation a continuous beam of laser light can be obtained from a gas laser. This is an advantage over other types of lasers[a] which generally produce only pulses of laser light.

The first gas laser, developed in 1961, led the way to numerous developments in this field. Since 1971 the patent activity in this technology has been growing at an average annual rate of 36%, which is about 15 times the average for all technologies combined. The following graph illustrates this growth.



a. Three other types of lasers are the solid state, liquid and semiconductor lasers.

The foreign share of the patent activity amounts to 18% of all patents issued, which is only slightly more than half the average of 30% for all technologies combined. The following "country table" indicates the distribution of the patents which have issued in this area over the past ten fiscal years.

DISTRIBUTION OF PATENTS IN AREA OF INTEREST

	FY66	67	68	69	70	71	72	73	74	75	TOTAL FY66-75
TOTAL PATENTS	1	4	2	13	12	18	40	21	25	39	179
UNITED STATES	1	3	2	10	9	16	34	18	18	32	147
TOTAL FOREIGN		1		3	3	2	6	3	7	7	32
NETHERLANDS					2	1	2	1	1		7
GERMANY		1		2		1		1	1	1	7
FRANCE				1					3	2	6
JAPAN					1		2		1	1	5
UNITED KINGDOM							1		1	1	3
CANADA								1		1	2
SWEDEN							1				1
USSR										1	1

Thrust Of The Technology

Gas lasers may conveniently be divided into seven broad subdivisions: atomic lasers (3) , molecular lasers (4), ion lasers (5), chemical lasers (6), lasers which employ monoenergetic electrons for excitation (7), those involving vibrational energy transfer (8) and those which employ unusual excitation techniques [e.g., transfer discharge laser (9), traveling wave excited lasers (10) and gas dynamic lasers (11)].

Most of the patent activity has been directed to obtaining:

- wider selection of emission frequencies
- greater frequency and amplitude stability
- greater output power
- higher energy conversion efficiencies

Emission Frequencies:

The search for more emission frequencies, or wavelengths, has essentially been reduced to a search for additional lasing materials. Literally thousands of laser materials and their characteristic emission frequencies have been catalogued and published. Recent patents utilize gas lasing mediums consisting of carbon dioxide - nitrogen - helium - water vapor (12);

carbon dioxide - nitrogen (13); helium - cadmium (14); krypton - helium (15); helium - nitrogen - carbon dioxide - benzene or alkyl benzene (16); carbon monoxide or carbon dioxide - diazo gas (diazomethane or cyclodiazomethane) (17); or cesium - copper (18).

Several lasing mediums have been patented recently wherein the active medium is formed in situ. Examples are carbon monoxide from hydrogen - air - acetylene (19) or ketene (20); iodine from perfluoromethyl iodide and hexafluoroazomethane (21); and fluorine from hydrogen fluoride, helium and molecular hydrogen (22).

Materials have also been found which extend the frequency boundaries into the X-ray and gamma ray range (23).

Frequency And Amplitude Stability:

The related problems of frequency and amplitude stability were attacked almost from the moment of the laser's inception. Most techniques attempt to minimize these problems by monitoring the laser output and comparing it with a reference or standard. This provides a feedback or control signal which compensates for shifts in frequency or amplitude (24).

Output Power:

The quest for greater output power has produced some of the most unusual types of lasers. These include lasers which utilize large scale explosion, rocket type exhausts (25) and mile long dimensions (26). These are generally massive devices which are quite expensive to construct. Many of these have military applications.

Efficiency:

Laser efficiency remains a formidable problem and one for which no adequate solution is in sight. The conversion of input energy to useful output power was very small in the earliest lasers and is only slightly better in the most modern versions. Approaches to this problem vary from ways to pump existing lasers more efficiently, to development of new laser mediums which are inherently more efficient. Recent examples of these, leading to more efficient carbon monoxide lasers, employ a supersonic nozzle to decrease the translational temperature of the gas (27) or, xenon or mercury vapor together with carbon monoxide in the discharge tube (28).

Research efforts in the future will undoubtedly continue to focus on improving the quality and quantity of the laser output, especially the output power and energy conversion efficiency.

Technology Analysis by
William Sikes
Patent Examiner

GAS LASERS - BIBLIOGRAPHY [a]

	PATENT NUMBER	INVENTOR	ASSIGNEE	COUNTRY
1.	2929922	Schawlow et al.	Bell Telephone Labs, Inc.	USA
2.	3353115	Maiman	Hughes Aircraft Co.	USA
3.	3172057	Bennett	Bell Telephone Labs, Inc.	USA
4.	3596202	Patel	Bell Telephone Labs, Inc.	USA
5.	3413568	Gordon et al.	Bell Telephone Labs, Inc.	USA
6.	3623145	Gregg et al.	U.S. Atomic Energy Commission	USA
7.	3403353	Lamb et al.	Bell Telephone Labs, Inc.	USA
8.	3618129	Ultee	United Aircraft Corp.	USA
9.	3696307	Beaulieu et al.	Canada	Canada
10.	3821664	Godard	Co. General D' Electricite	France
11.	3694770	Burwell et al.	United Aircraft Corp.	USA
12.	3742378	Timmermans	U.S. Phillips Corp.	USA
13.	3745482	Patel	Bell Telephone Labs, Inc.	USA
14.	3748595	Rigden	Perkin-Elmer Corp.	USA
15.	3792371	Tomiyama et al.	Hitachi-Limited	Japan
16.	3813612	Schriever et al.	U.S.A.F.	USA
17.	3842369	Melamed et al.	Westinghouse Electric Corp.	USA
18.	3831107	Karras	General Electric Co.	USA
19.	3781713	Bury et al.	U.S.A.F.	USA
20.	3864646	Phillips et al.	Westinghouse Electric Corp.	USA
21.	3842364	Srinivasan	IBM Corp.	USA
22.	3882414	Jeffers et al.	McDonnel Douglas Corp.	USA
23.	3484721	Bond et al.	Bell Telephone Labs, Inc.	USA
24.	3453557	Polanyi et al.	Laser, Inc.	USA
25.	3842363	Dobrzelecki et al.	U.S.A.F.	USA
26.	3886480	Vali et al.	none	USA
27.	3811095	Rich et al.	Calspan Corp.	USA
28.	3761838	Bhaumik et al.	Northrop Corp.	USA

a. Includes patents through June 1975 available to the patent examiner at the time this report was prepared.

SECTION II

PATENT ACTIVITY IN STANDARD INDUSTRIAL CLASSIFICATION FIELDS

General

The premise underlying the work of the Office of Technology Assessment and Forecast (OTAF) is that U. S. patent activity is an indicator and measure of technological activity. As such, patent data, because of their objective characteristics, represent a tool for use in analyzing technological efforts.

The very nature of patents makes evident the significance of patent data in carrying out such analyses. Each patent granted is required by law to set forth an invention that is new and not a mere obvious adaptation of the existing technology. Because of the expense involved in obtaining patents, generally only those inventions felt to have potential commercial merit and expected to recoup their costs are patented. Therefore, by comparing patenting among various technological areas, one can often get an objective picture of the effective technological effort in those areas.

Patent data alone can be used to ascertain technological trends in both broad and very specific areas across the entire technological spectrum. However, a much more complete picture might be obtained by correlating the patent data with other information relating to technological activity. Particularly intriguing has been the possibility of correlating patent data with information of an economic nature, such as data on R&D expenditures or R&D manpower allocations.

Yet, in order to correlate patent data and economic data, one must first develop the relationships between the U. S. Patent Classification System (USPC) and the Standard Industrial Classification System (SIC) - the most commonly used categorization for collecting resource and economic data. It is at this point that previous large scale efforts in the area have become stymied.

In 1974, however, the Science Indicators Unit of the National Science Foundation (NSF) asked OTAF to develop patent data in industrial product fields comparable with those of the SIC. The requested data was to be used in the preparation of NSF's bi-annual Science Indicators publication.

To carry out this project, the building of a concordance between the Standard Industrial Classification System and the U. S. Patent Classification System became a necessary initial goal. Once accomplished, it was possible to use the concordance for meeting the ultimate objective of furnishing NSF with information on patent output in various industrial product groupings.

Methodology

A detailed concordance directly relating specific SIC industries to patent classes and subclasses, while an ultimate aim, was beyond the scope of techniques available at the time the project was undertaken. Therefore, as a first step in the development of such a detailed concordance, OTAF manually related patent classifications to certain SIC manufacturing industries aggregated together to form product fields.

NSF furnished OTAF with a list of thirty product fields and the SIC industries that had been grouped together to form each. (This Product Field list immediately follows this introduction). Each of these fields is defined by one or more two- or three-digit SIC industry categories. In some cases four-digit specific industry codes are used to further delineate the product fields.

The SIC is an establishment based classification system with its categories created to correspond to fields of industrial activity. The USPC, on the other hand, uses as its basis of classification the technological features that make inventions patentable - elements of structure; functions of products and apparatus; and, processes of manufacture and preparation.

Because of the nature of each classification system, the basic questions asked in relating patent classifications to SIC categories were: "What type of establishment would be engaged in producing the products or apparatus having the structural or functional features encompassed by that patent classification? or "What type of establishment, in producing products or apparatus, would be carrying out the process steps included in the patent classification?"

In those cases where these questions could not be clearly answered and ambiguity existed as to which of several possible SIC groups to assign a patent classification, it was placed in all of the possible groups. This was done on the theory that the technology disclosed in the patents in those classifications was pertinent to each of the several product groups.

The documents that served as the basic tools in relating patent classification to SIC product fields were the U. S. Patent Classification Manual updated through June 30, 1973, and the 1972 edition of the Standard Industrial Classification Manual. 1/ The fifteen volume set of Definitions of U. S. Patent Classifications was also used in those instances where Class and subclass titles were not sufficiently descriptive to permit assignment to product fields.

1/ A project is presently underway to update the concordance to reflect all changes to the U. S. Patent Classification System through June 30, 1975.

As the first phase of creating the concordance, each of the over 300 major Classes of the USPC was considered. For each Class it was determined whether the subject matter of the Class was sufficiently homogeneous to permit its assignment in whole or in major portion to the relevant product fields. More than one-half of the classes were susceptible to assignment in this manner.

The detailed analysis of the non-homogeneous classes involved scanning the subclass blocks within each Class to determine the extent to which they were amenable to assignment as a whole to the relevant product fields. If they were not, then each subclass was considered individually until all were assigned.

The NSF supplied list of product fields was limited almost exclusively to manufacturing industries and did not include fields such as construction, agriculture and most areas of mining. Even in manufacturing, industries such as tobacco, apparel, paper, furniture and lumber were not included. Because the technological spectrum encompassed by the patent classification system is much broader than the industries represented in the thirty specified product fields, some subclasses were excluded. However, these subclasses contain less than four percent of the total patents issued during the period under consideration.

Once the concordance was completed it was possible to access the OTAF data base, extract all U.S. patents for the period 1963 through June 30, 1973 and, through the concordance, classify these patents into the 30 specified product fields. These patents were also assigned to six additional broad groupings which were specified by NSF as combinations of twenty-one of the thirty product fields.

This procedure resulted in the extraction of about 5.1 million patent records consisting of 3.14 million records in the 30 specific product fields and 1.95 million in the additional six combination fields. These counts, however, reflect patents being counted more than once in a given product field because of: 1) the Patent and Trademark Office practice of cross-referencing patents into all subclasses for which they contain inventive disclosure; and, 2) the fact that in creating the concordance many related subclasses were often combined into a single product field.

To provide a more accurate picture of patent activity by product field, a computerized duplicate elimination procedure was used to eliminate the distorting affect of multiple counting of patents within a single field. After application of this procedure a total of 2.1 million unique patent placements remained.

To provide a picture of how this total is distributed among the thirty specific fields and six combination fields, the thirty-six fields, along

with the total number of unique patents placed in each in the period from 1963 through June 30, 1973, are shown on the page subsequent to the Product Field list immediately following this introduction. The number given for each of the six combination fields is less than the sum of the patent totals for its components because patents appearing in more than one of the components were counted only once in forming the combination field.

This file was then summarized on the basis of year of issue of patents, U. S. or foreign residence of inventor, and type of ownership of patents for each product field. Since, at the time the report was prepared, actual data was available only through the first six months of 1973, all 1973 figures were doubled to produce estimated annual totals for 1973. The summary file served as the input to the programs that produced the accompanying statistical table and graph for each product field.

Explanation of Tables

The table for each field shows how the U. S. patents found in it are distributed on a year-by-year basis. The top portion of the table is the distribution of patents while the lower portion shows percentage distribution of patents.

For each year the total number of placements of U. S. patents in the product field is first broken down as to origin - the United States or a foreign country. A patent is considered to have originated in the United States if it issued to an inventor who is a U. S. resident. If the inventor is a resident of a foreign country, the patent is considered to be of foreign origin.

U. S. origin patents are then further broken down as to ownership. Ownership is determined by whether or not the inventor had assigned ownership rights at the time the patent issued and, if so, to whom those rights had been assigned. If the patent was not assigned at that time or if rights were assigned to an individual person who was a U. S. resident, then the patent is considered to be owned by a U. S. individual. Other categories take care of those patents which were assigned to corporations domiciled in the United States or to agencies of the U. S. government. Any U. S. origin patent assigned to a foreign corporation, individual or government entity is considered to be foreign owned.

Ownership of foreign origin patents is similarly determined through their assignment. Any foreign origin patent which is unassigned or assigned to a foreign entity is deemed as foreign owned while those assigned to U. S. entities are counted as U. S. owned.

The figures in the tables reflect assignments up to the time of patent issue; but, patents can be assigned even after they have issued. Consequently, the figures for government, corporate and foreign ownership of U.S. origin patents should be considered as minimum values for these categories. Likewise the figures for U.S. ownership of foreign origin patents should be considered as minimum values. This is especially true of this latter category, since those foreign origin patents assigned to foreign incorporated subsidiaries of U.S. corporations are counted as foreign owned and not as U.S. owned.

Explanation of Graphs

The table for each product field is followed by a graph. Depicted are the trends in total, U.S., and foreign origin patenting activity over the last eleven years. Also shown are the relative contributions to that actity of U.S. and foreign origin patents.

SIC PRODUCT FIELDS

Product Field	SIC Category
Food and Kindred Products	20
Textile Mill Products	22
Basic Industrial Inorganic and Organic Chemicals	281, 286
Plastics Materials and Synthetic Resins	282
Agricultural Chemicals	287
All Other Chemicals	284, 285, 289
Drugs and Medicine	283
Petroleum and Natural Gas Extraction and Petroleum Refining	13, 29
Rubber and Miscellaneous Plastics Products	30
Stone, Clay, Glass and Concrete Products	32
Primary Ferrous Products	331, 332, 3399, 3462
Primary and Secondary Non-Ferrous Metals	333-336, 339 (except 3399), 3463
Fabricated Metal Products	34 (except 3462, 3463, 348)
Engines and Turbines	351
Farm and Garden Machinery and Equipment	352
Construction, Mining and Material Handling Machinery and Equipment	353
Metalworking Machinery and Equipment	354
Office, Computing and Accounting Machines	357
Other Machinery, except Electrical	355, 356, 358 359
Electrical Transmission and Distribution Equipment	361, 3825
Electrical Industrial Apparatus	362
Other Electrical Machinery, Equipment and Supplies	363, 364, 369
Radio and Television Receiving Equipment, except Communication Types	365
Electronic Components and Accessories and Communication Equipment	366-367
Motor Vehicles and Motor Vehicle Equipment	371
Guided Missiles and Space Vehicles and Parts	376
Other Transportation Equipment	373-375, 379 (except 3795)
Ordinance, except Missiles	348, 3795
Aircraft and Parts	372
Professional and Scientific Instruments	38 (except 3825)

SIC PRODUCT FIELDS

Patent Totals, 1963-June 30, 1973 & Page Reference

Product Field	Patents	Page
Food and Kindred Products	10,875	98
Textile Mill Products	16,033	100
Chemicals, Except Drugs and Medicines	126,595	102
Basic Industrial Inorganic and Organic Chemicals	82,820	104
Plastics Materials and Synthetic Resins	42,361	106
Agricultural Chemicals	20,932	108
All Other Chemicals	27,571	110
Drugs and Medicines	26,831	112
Petroleum and Natural Gas Extraction and Petroleum Refining	12,944	114
Rubber and Miscellaneous Plastics Products	74,117	116
Stone, Clay, Glass and Concrete Products	44,849	118
Primary Metals	17,351	120
Primary Ferrous Products	14,288	122
Primary and Secondary Non-Ferrous Metals	11,270	124
Fabricated Metal Products	152,094	126
Machinery, Except Electrical	282,742	128
Engines and Turbines	20,826	130
Farm and Garden Machinery and Equipment	30,911	132
Construction, Mining and Material Handling Machinery and Equipment	54,442	134
Metalworking Machinery and Equipment	30,607	136
Office, Computing and Accounting Machines	36,347	138
Other Machinery, except Electrical	199,621	140
Electrical Equipment, Except Communication Equipment	123,136	142
Electrical Transmission and Distribution Equipment	44,266	144
Electrical Industrial Apparatus	45,077	146
Other Electrical Machinery, Equipment and Supplies	67,665	148
Communication Equipment and Electronic Components	110,215	150
Radio and Television Receiving Equipment, except Communication Types	20,630	152
Electronic Components and Accessories and Communication Equipment	108,845	154
Motor Vehicles and Other Transportation Equipment, Except Aircraft	55,801	156
Motor Vehicles and Motor Vehicle Equipment	31,505	158
Guided Missiles and Space Vehicles and Parts	8,814	160
Other Transportation Equipment	23,132	162
Ordinance, except Missiles	6,447	164
Aircraft and Parts	16,459	166
Professional and Scientific Instruments	105,472	168

FOOD AND KINDRED PRODUCTS

NUMBER OF PATENTS

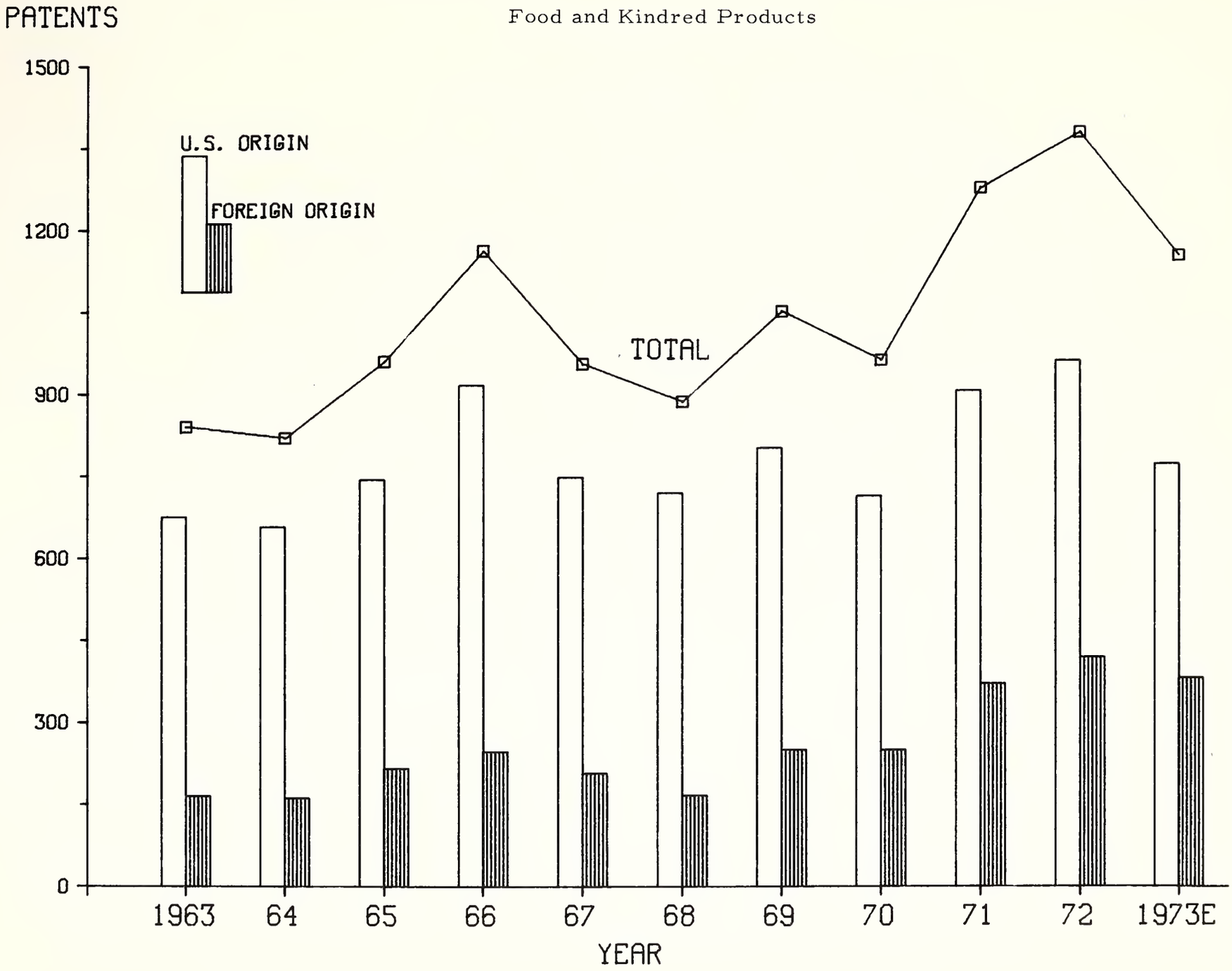
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	840	819	959	1162	955	886	1052	963	1279	1382	1156
ORIGINATING IN THE UNITED STATES	675	657	743	916	748	719	802	714	908	963	774
ORIGINATING IN OTHER COUNTRIES	165	162	216	246	207	167	250	249	371	419	382
PATENTS ORIGINATING IN THE UNITED STATES	675	657	743	916	748	719	802	714	908	963	774
OWNED BY UNITED STATES CORPORATIONS	529	522	581	716	582	571	638	548	742	714	578
OWNED BY UNITED STATES INDIVIDUALS	125	110	129	176	132	117	131	136	128	202	138
OWNED BY UNITED STATES GOVERNMENT	19	20	30	23	30	25	25	20	29	32	42
FOREIGN OWNED	2	5	3	1	4	6	8	10	9	15	16
PATENTS ORIGINATING IN OTHER COUNTRIES	165	162	216	246	207	167	250	249	371	419	382
UNITED STATES OWNED	29	18	36	46	36	28	39	41	59	54	30
FOREIGN OWNED	136	144	180	200	171	139	211	208	312	365	352

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.4	80.2	77.5	78.8	78.3	81.2	76.2	74.1	71.0	69.7	67.0
ORIGINATING IN OTHER COUNTRIES	19.6	19.8	22.5	21.2	21.7	18.8	23.8	25.9	29.0	30.3	33.0
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	78.4	79.5	78.2	78.2	77.8	79.4	79.6	76.8	81.7	74.1	74.7
OWNED BY UNITED STATES INDIVIDUALS	18.5	16.7	17.4	19.2	17.7	16.3	16.3	19.0	14.1	21.0	17.8
OWNED BY UNITED STATES GOVERNMENT	2.8	3.0	4.0	2.5	4.0	3.5	3.1	2.8	3.2	3.3	5.4
FOREIGN OWNED	.3	.9	.4	.1	.5	.8	1.0	1.4	1.0	1.6	2.1
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	17.6	11.1	16.7	18.7	17.4	16.8	15.6	16.5	15.9	12.9	7.9
FOREIGN OWNED	82.4	88.9	83.3	81.3	82.6	83.2	84.4	83.5	84.1	87.1	92.1

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Food and Kindred Products



TEXTILE MILL PRODUCTS

NUMBER OF PATENTS

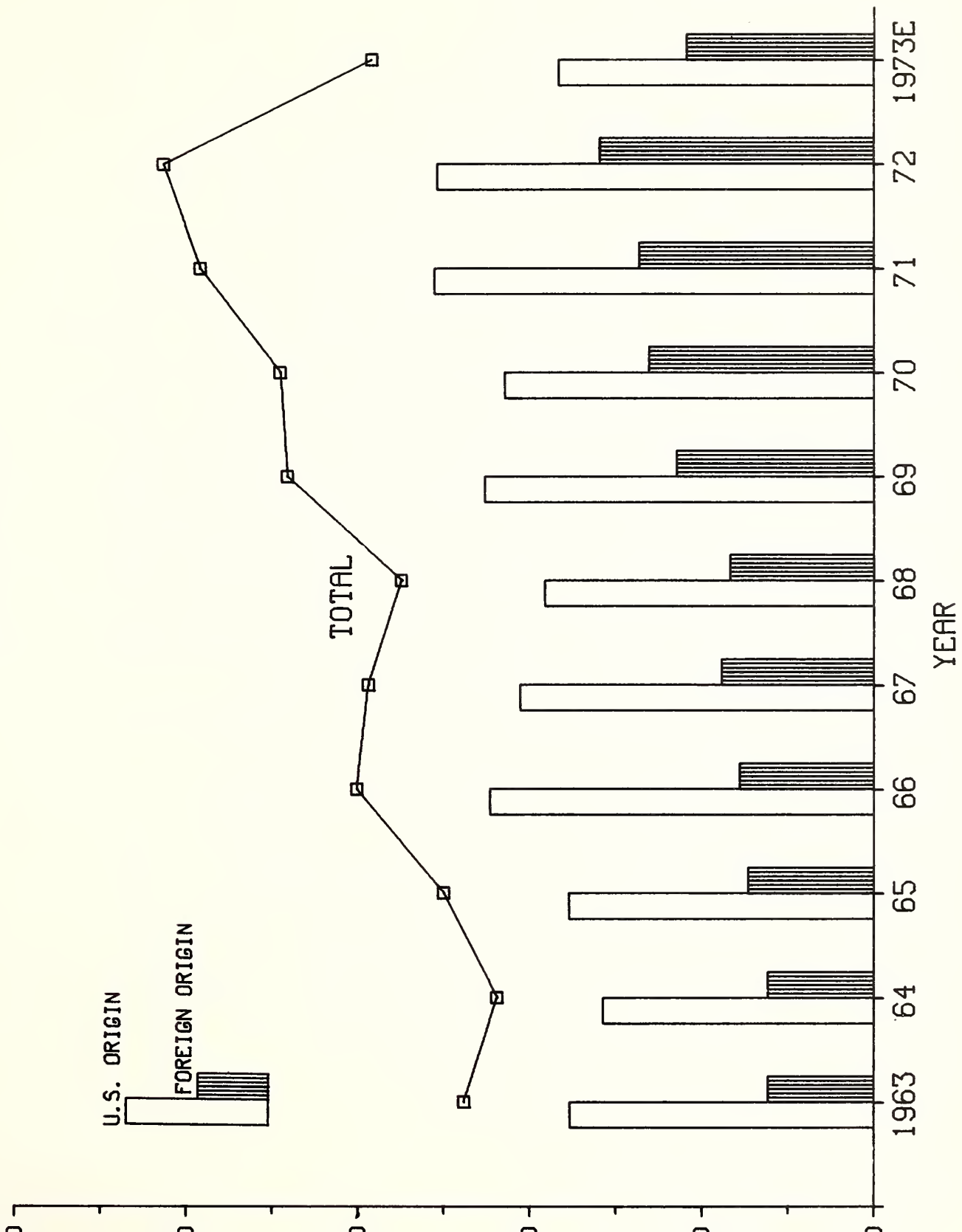
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1189	1093	1248	1500	1466	1369	1701	1722	1955	2062	1456
ORIGINATING IN THE UNITED STATES	882	786	884	1112	1026	953	1129	1070	1275	1267	914
ORIGINATING IN OTHER COUNTRIES	307	307	364	388	440	416	572	652	680	795	542
PATENTS ORIGINATING IN THE UNITED STATES	882	786	884	1112	1026	953	1129	1070	1275	1267	914
OWNED BY UNITED STATES CORPORATIONS	724	651	744	934	845	807	972	911	1051	985	748
OWNED BY UNITED STATES INDIVIDUALS	133	111	119	136	139	104	122	110	170	217	140
OWNED BY UNITED STATES GOVERNMENT	24	19	16	35	33	36	30	39	45	57	26
FOREIGN OWNED	1	5	5	7	9	6	5	10	9	8	0
PATENTS ORIGINATING IN OTHER COUNTRIES	307	307	364	388	440	416	572	652	680	795	542
UNITED STATES OWNED	25	17	30	45	35	42	46	58	50	42	38
FOREIGN OWNED	282	290	334	343	405	374	526	594	630	753	504

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	74.2	71.9	70.8	74.1	70.0	69.6	66.4	62.1	65.2	61.4	62.8
ORIGINATING IN OTHER COUNTRIES	25.8	28.1	29.2	25.9	30.0	30.4	33.6	37.9	34.8	38.6	37.2
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	82.1	82.8	84.2	84.0	82.4	84.7	86.1	85.1	82.4	77.7	81.8
OWNED BY UNITED STATES INDIVIDUALS	15.1	14.1	13.4	12.2	13.5	10.9	10.8	10.3	13.4	17.2	15.4
OWNED BY UNITED STATES GOVERNMENT	2.7	2.5	1.8	3.2	3.2	3.8	2.7	3.7	3.5	4.5	2.8
FOREIGN OWNED	.1	.6	.6	.6	.9	.6	.4	.9	.7	.6	0.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.1	5.5	8.2	11.6	8.0	10.1	8.0	8.9	7.4	5.3	7.0
FOREIGN OWNED	91.9	94.5	91.8	88.4	92.0	89.9	92.0	91.1	92.6	94.7	93.0

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Textile Mill Products



CHEMICALS, EXCEPT DRUGS AND MEDICINES

NUMBER OF PATENTS

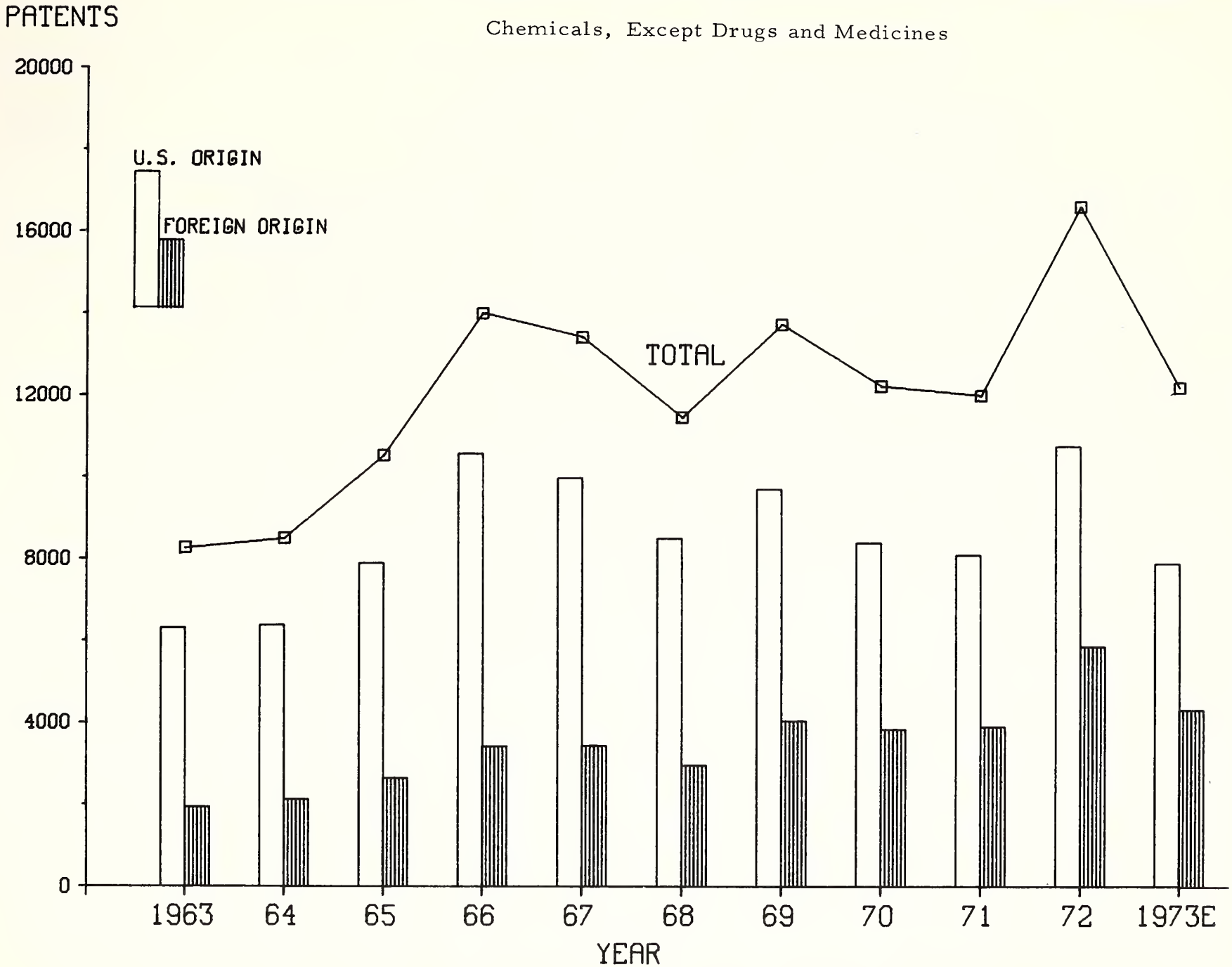
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	8254	8494	10507	13969	13386	11435	13701	12200	11975	16587	12174
ORIGINATING IN THE UNITED STATES	6310	6374	7871	10551	9953	8482	9672	8374	8079	10736	7872
ORIGINATING IN OTHER COUNTRIES	1944	2120	2636	3418	3433	2953	4029	3826	3896	5851	4302
PATENTS ORIGINATING IN THE UNITED STATES	6310	6374	7871	10551	9953	8482	9672	8374	8079	10736	7872
OWNED BY UNITED STATES CORPORATIONS	5645	5713	7066	9402	8865	7647	8716	7515	7235	9128	6752
OWNED BY UNITED STATES INDIVIDUALS	424	418	543	771	682	462	581	497	498	1154	634
OWNED BY UNITED STATES GOVERNMENT	214	225	250	331	343	300	302	297	309	392	430
FOREIGN OWNED	27	18	12	47	63	73	73	65	37	62	56
PATENTS ORIGINATING IN OTHER COUNTRIES	1944	2120	2636	3418	3433	2953	4029	3826	3896	5851	4302
UNITED STATES OWNED	303	343	414	566	534	484	574	585	490	646	464
FOREIGN OWNED	1641	1777	2222	2852	2899	2469	3455	3241	3406	5205	3838

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	76.4	75.0	74.9	75.5	74.4	74.2	70.6	68.6	67.5	64.7	64.7
ORIGINATING IN OTHER COUNTRIES	23.6	25.0	25.1	24.5	25.6	25.8	29.4	31.4	32.5	35.3	35.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	89.5	89.6	89.8	89.1	89.1	90.2	90.1	89.7	89.6	85.0	85.8
OWNED BY UNITED STATES INDIVIDUALS	6.7	6.6	6.9	7.3	6.8	5.4	6.0	6.0	6.1	10.8	8.0
OWNED BY UNITED STATES GOVERNMENT	3.4	3.5	3.1	3.2	3.5	3.5	3.1	3.5	3.8	3.6	5.5
FOREIGN OWNED	.4	.3	.2	.4	.6	.9	.8	.8	.5	.6	.7
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	15.6	16.2	15.7	16.6	15.6	16.4	14.2	15.3	12.6	11.0	10.8
FOREIGN OWNED	84.4	83.8	84.3	83.4	84.4	83.6	85.8	84.7	87.4	89.0	89.2

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Chemicals, Except Drugs and Medicines



BASIC INDUSTRIAL INORGANIC AND ORGANIC CHEMICALS

NUMBER OF PATENTS

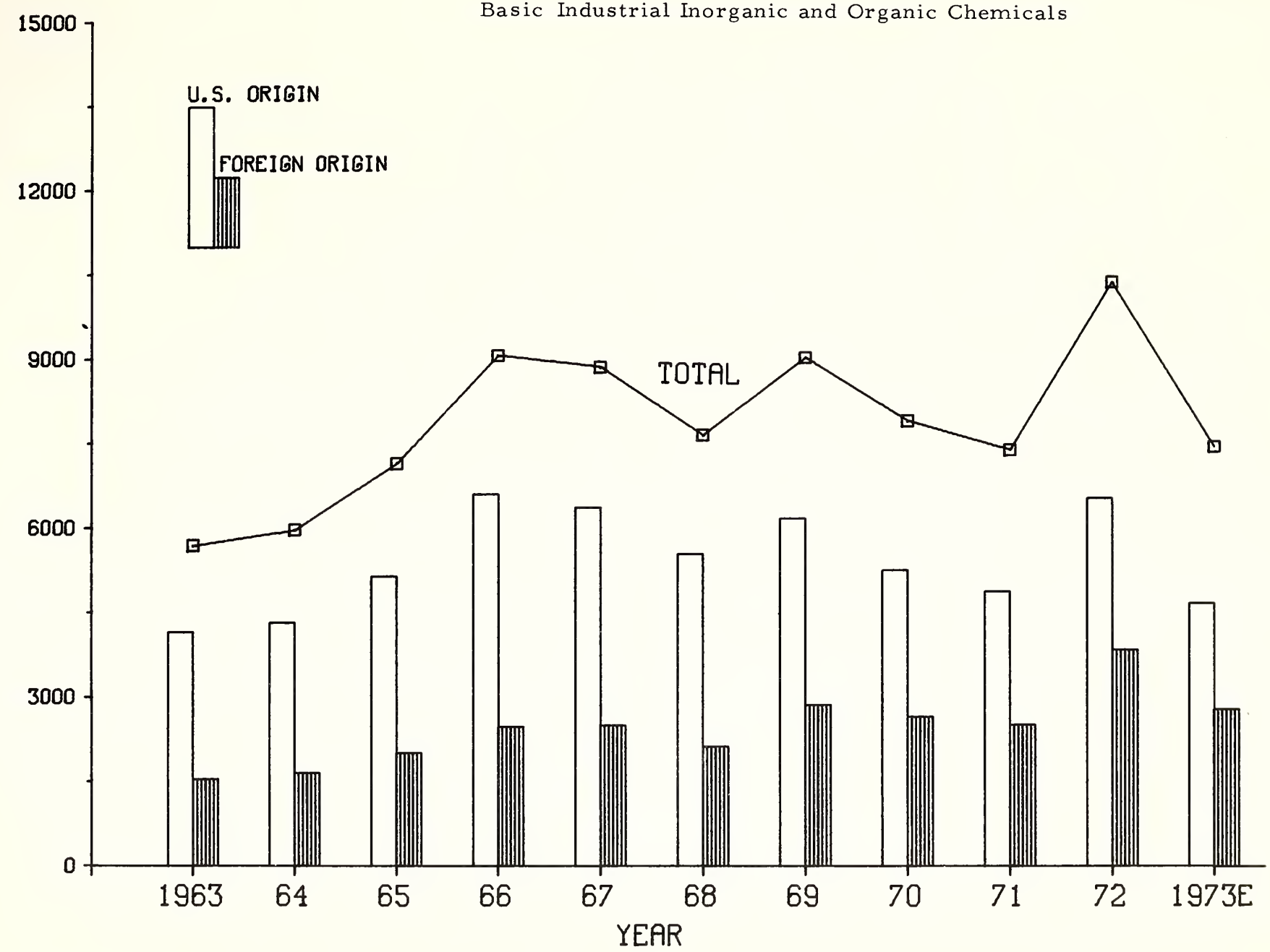
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	5687	5968	7142	9069	8860	7657	9031	7906	7390	10382	7456
ORIGINATING IN THE UNITED STATES	4147	4317	5134	6600	6365	5541	6176	5258	4880	6535	4676
ORIGINATING IN OTHER COUNTRIES	1540	1651	2008	2469	2495	2116	2855	2648	2510	3847	2780
PATENTS ORIGINATING IN THE UNITED STATES	4147	4317	5134	6600	6365	5541	6176	5258	4880	6535	4676
OWNED BY UNITED STATES CORPORATIONS	3754	3947	4691	5985	5716	5034	5620	4766	4399	5609	4098
OWNED BY UNITED STATES INDIVIDUALS	225	202	273	368	379	257	316	260	261	681	344
OWNED BY UNITED STATES GOVERNMENT	145	154	161	210	222	188	180	186	195	206	198
FOREIGN OWNED	23	14	9	37	48	62	60	46	25	39	36
PATENTS ORIGINATING IN OTHER COUNTRIES	1540	1651	2008	2469	2495	2116	2855	2648	2510	3847	2780
UNITED STATES OWNED	241	278	327	422	397	353	430	431	325	448	306
FOREIGN OWNED	1299	1373	1681	2047	2098	1763	2425	2217	2185	3399	2474

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	72.9	72.3	71.9	72.8	71.8	72.4	68.4	66.5	66.0	62.9	62.7
ORIGINATING IN OTHER COUNTRIES	27.1	27.7	28.1	27.2	28.2	27.6	31.6	33.5	34.0	37.1	37.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	90.5	91.4	91.4	90.7	89.8	90.9	91.0	90.6	90.1	85.8	87.6
OWNED BY UNITED STATES INDIVIDUALS	5.4	4.7	5.3	5.6	6.0	4.6	5.1	5.0	5.4	10.5	7.4
OWNED BY UNITED STATES GOVERNMENT	3.5	3.6	3.1	3.1	3.4	3.4	2.9	3.5	4.0	3.1	4.2
FOREIGN OWNED	.6	.3	.2	.6	.8	1.1	1.0	.9	.5	.6	.8
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	15.6	16.8	16.3	17.1	15.9	16.7	15.1	16.3	12.9	11.6	11.0
FOREIGN OWNED	84.4	83.2	83.7	82.9	84.1	83.3	84.9	83.7	87.1	88.4	89.0

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Basic Industrial Inorganic and Organic Chemicals



PLASTICS MATERIALS AND SYNTHETIC RESINS

NUMBER OF PATENTS

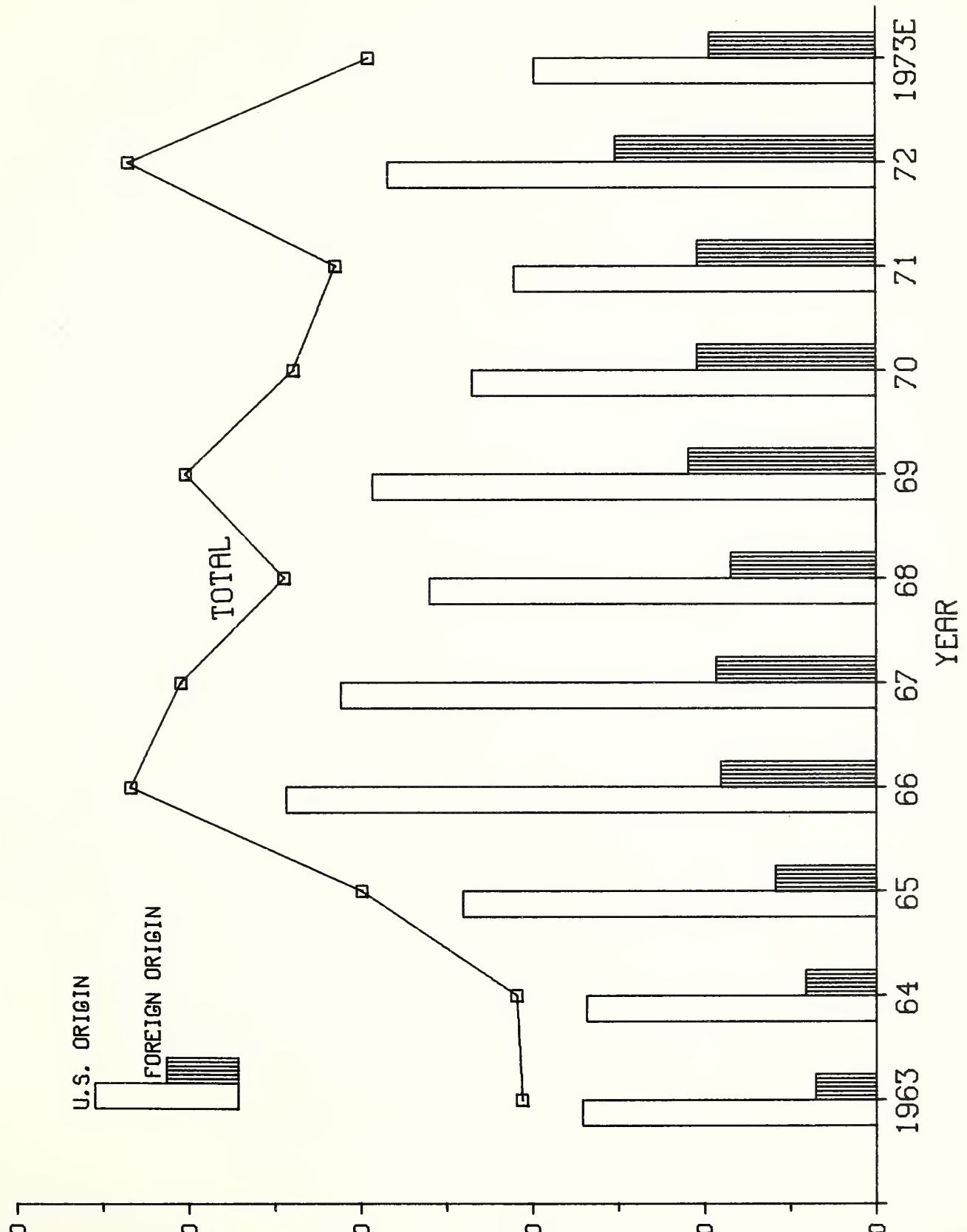
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2473	2510	3587	5196	4847	4124	4813	4060	3767	5215	3538
ORIGINATING IN THE UNITED STATES	2049	2019	2883	4113	3732	3112	3507	2814	2523	3401	2382
ORIGINATING IN OTHER COUNTRIES	424	491	704	1083	1115	1012	1306	1246	1244	1814	1156
PATENTS ORIGINATING IN THE UNITED STATES	2049	2019	2883	4113	3732	3112	3507	2814	2523	3401	2382
OWNED BY UNITED STATES CORPORATIONS	1903	1863	2647	3726	3434	2885	3234	2582	2320	2941	2140
OWNED BY UNITED STATES INDIVIDUALS	108	118	172	288	207	144	169	131	138	336	162
OWNED BY UNITED STATES GOVERNMENT	33	31	60	80	69	72	82	87	53	105	68
FOREIGN OWNED	5	7	4	19	22	11	22	14	12	19	12
PATENTS ORIGINATING IN OTHER COUNTRIES	424	491	704	1083	1115	1012	1306	1246	1244	1814	1156
UNITED STATES OWNED	55	71	96	160	154	133	126	122	108	136	86
FOREIGN OWNED	369	420	608	923	961	879	1180	1124	1136	1678	1070

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	82.9	80.4	80.4	79.2	77.0	75.5	72.9	69.3	67.0	65.2	67.3
ORIGINATING IN OTHER COUNTRIES	17.1	19.6	19.6	20.8	23.0	24.5	27.1	30.7	33.0	34.8	32.7
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	92.9	92.3	91.8	90.6	92.0	92.7	92.2	91.8	92.0	86.5	89.8
OWNED BY UNITED STATES INDIVIDUALS	5.2	5.8	6.0	7.0	5.6	4.6	4.8	4.6	5.4	9.9	6.8
OWNED BY UNITED STATES GOVERNMENT	1.7	1.6	2.1	1.9	1.8	2.3	2.4	3.1	2.1	3.0	2.9
FOREIGN OWNED	.2	.3	.1	.5	.6	.4	.6	.5	.5	.6	.5
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	13.0	14.5	13.6	14.8	13.8	13.1	9.6	9.8	8.7	7.5	7.4
FOREIGN OWNED	87.0	85.5	86.4	85.2	86.2	86.9	90.4	90.2	91.3	92.5	92.6

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Plastics Materials and Synthetic Resins



AGRICULTURAL CHEMICALS

NUMBER OF PATENTS

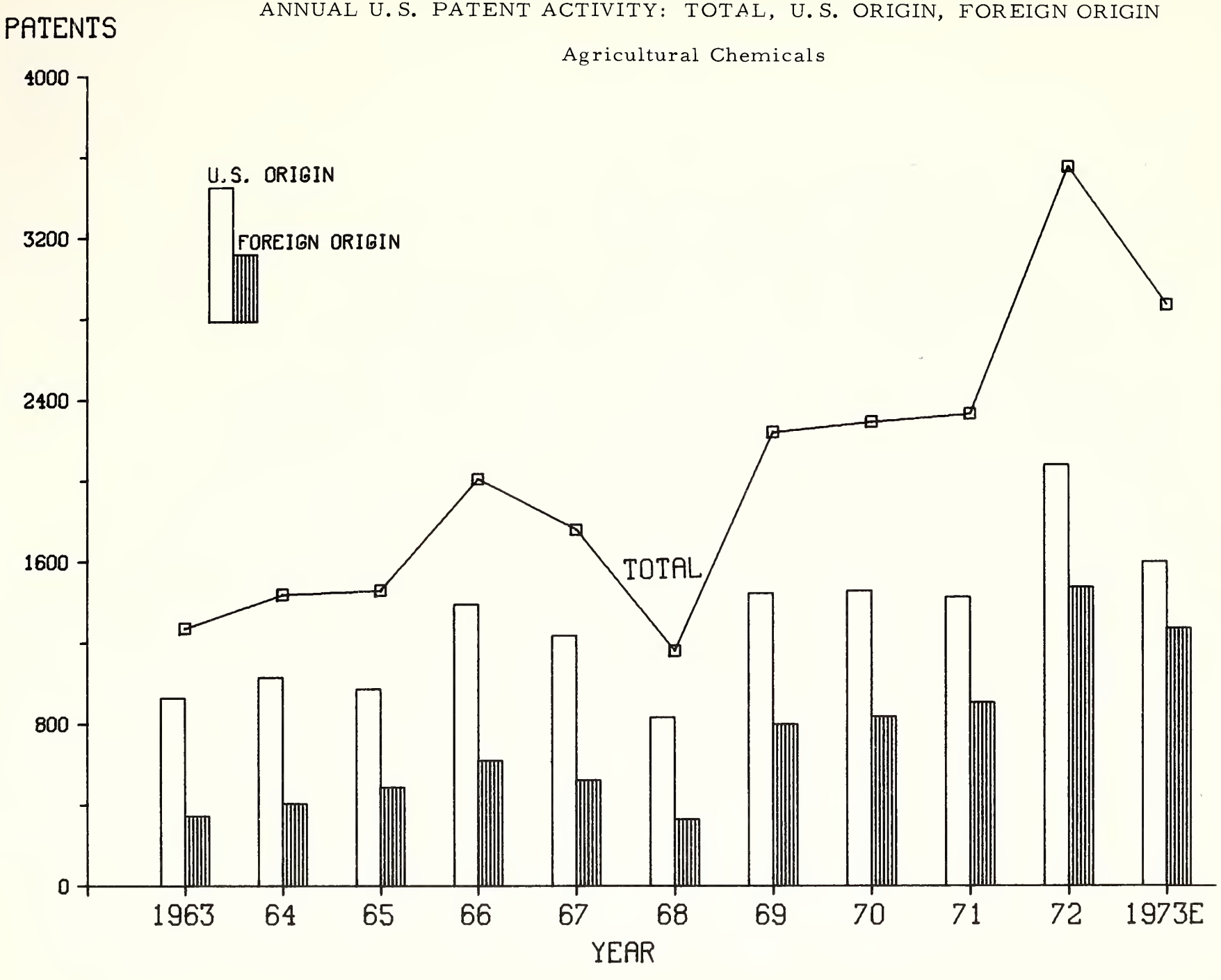
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1271	1438	1459	2007	1757	1160	2239	2289	2328	3550	2868
ORIGINATING IN THE UNITED STATES	926	1030	972	1388	1235	832	1443	1454	1425	2077	1598
ORIGINATING IN OTHER COUNTRIES	345	408	487	619	522	328	796	835	903	1473	1270
PATENTS ORIGINATING IN THE UNITED STATES	926	1030	972	1388	1235	832	1443	1454	1425	2077	1598
OWNED BY UNITED STATES CORPORATIONS	821	931	873	1233	1098	751	1333	1325	1304	1792	1406
OWNED BY UNITED STATES INDIVIDUALS	81	85	76	136	106	55	86	98	94	246	130
OWNED BY UNITED STATES GOVERNMENT	22	12	22	18	25	19	14	16	24	28	46
FOREIGN OWNED	2	2	1	1	6	7	10	15	3	11	16
PATENTS ORIGINATING IN OTHER COUNTRIES	345	408	487	619	522	328	796	835	903	1473	1270
UNITED STATES OWNED	60	60	91	115	108	72	176	212	153	227	190
FOREIGN OWNED	285	348	396	504	414	256	620	623	750	1246	1080

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	72.9	71.6	66.6	69.2	70.3	71.7	64.4	63.5	61.2	58.5	55.7
ORIGINATING IN OTHER COUNTRIES	27.1	28.4	33.4	30.9	29.7	28.3	35.6	36.5	38.8	41.5	44.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	88.7	90.4	89.8	88.8	88.9	90.3	92.4	91.1	91.5	86.3	88.0
OWNED BY UNITED STATES INDIVIDUALS	8.7	8.2	7.8	9.8	8.6	6.6	5.9	6.8	6.6	11.8	8.1
OWNED BY UNITED STATES GOVERNMENT	2.4	1.2	2.3	1.3	2.0	2.3	1.0	1.1	1.7	1.4	2.9
FOREIGN OWNED	.2	.2	.1	.1	.5	.8	.7	1.0	.2	.5	1.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	17.4	14.7	18.7	18.6	20.7	22.0	22.1	25.4	16.9	15.4	15.0
FOREIGN OWNED	82.6	85.3	81.3	81.4	79.3	78.0	77.9	74.6	83.1	84.6	85.0

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Agricultural Chemicals



ALL OTHER CHEMICALS

NUMBER OF PATENTS

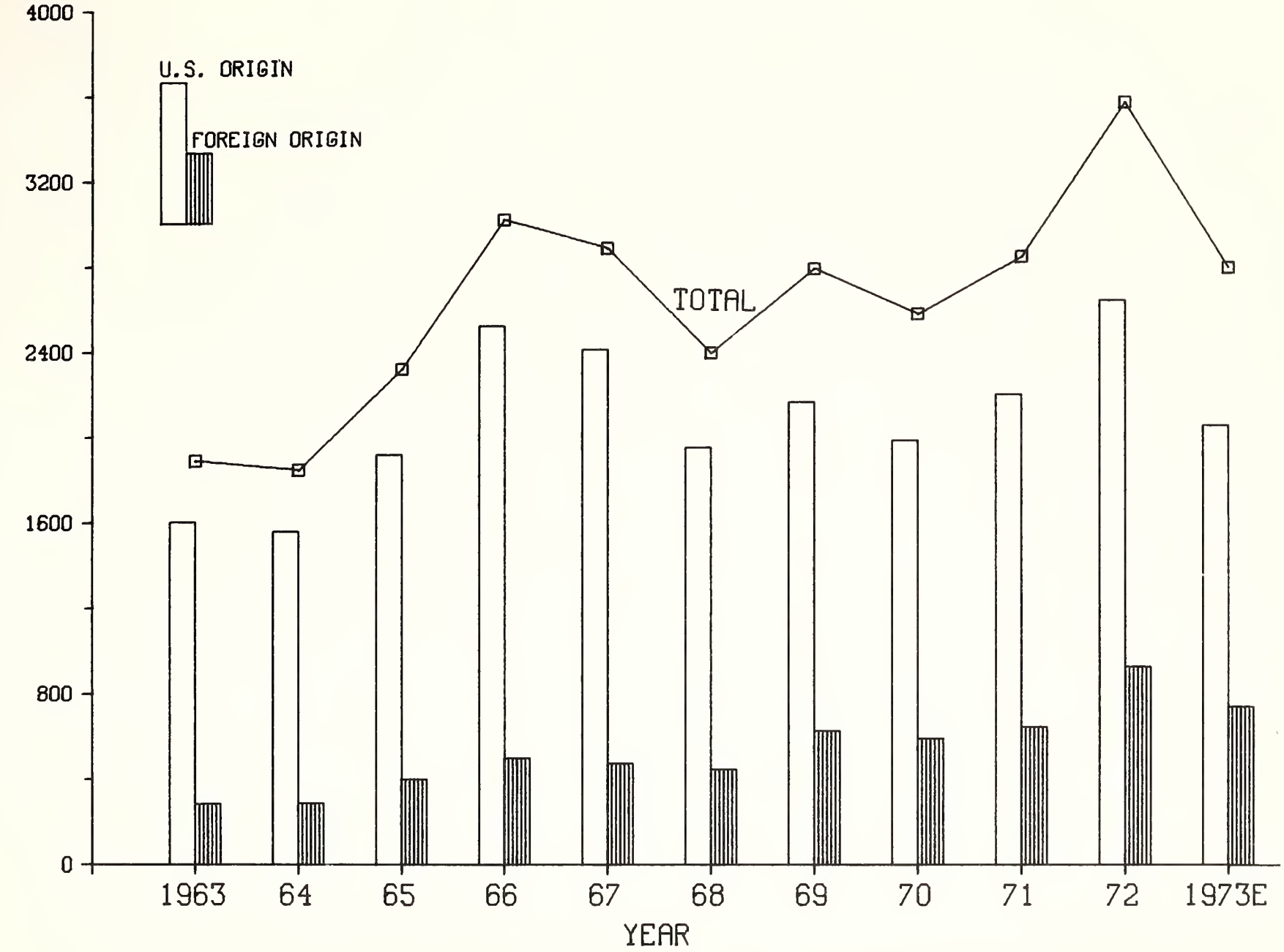
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1890	1849	2320	3021	2889	2399	2793	2581	2852	3576	2802
ORIGINATING IN THE UNITED STATES	1605	1560	1920	2523	2414	1953	2166	1990	2205	2648	2062
ORIGINATING IN OTHER COUNTRIES	285	289	400	498	475	446	627	591	647	928	740
PATENTS ORIGINATING IN THE UNITED STATES	1605	1560	1920	2523	2414	1953	2166	1990	2205	2648	2062
OWNED BY UNITED STATES CORPORATIONS	1386	1357	1681	2202	2096	1702	1885	1716	1906	2169	1598
OWNED BY UNITED STATES INDIVIDUALS	140	111	146	184	167	115	163	149	149	285	200
OWNED BY UNITED STATES GOVERNMENT	78	89	92	132	142	126	111	114	139	181	252
FOREIGN OWNED	1	3	1	5	9	10	7	11	11	13	12
PATENTS ORIGINATING IN OTHER COUNTRIES	285	289	400	498	475	446	627	591	647	928	740
UNITED STATES OWNED	71	57	80	120	85	91	118	113	104	143	118
FOREIGN OWNED	214	232	320	378	390	355	509	478	543	785	622

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.9	84.4	82.8	83.5	83.6	81.4	77.6	77.1	77.3	74.0	73.6
ORIGINATING IN OTHER COUNTRIES	15.1	15.6	17.2	16.5	16.4	18.6	22.4	22.9	22.7	26.0	26.4
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	86.4	87.0	87.6	87.3	86.8	87.1	87.0	86.2	86.4	81.9	77.5
OWNED BY UNITED STATES INDIVIDUALS	8.7	7.1	7.6	7.3	6.9	5.9	7.6	7.5	6.8	10.8	9.7
OWNED BY UNITED STATES GOVERNMENT	4.8	5.7	4.7	5.2	5.9	6.5	5.1	5.7	6.3	6.8	12.2
FOREIGN OWNED	.1	.2	.1	.2	.4	.5	.3	.6	.5	.5	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	24.9	19.7	20.0	24.1	17.9	20.4	18.8	19.1	16.1	15.4	15.9
FOREIGN OWNED	75.1	80.3	80.0	75.9	82.1	79.6	81.2	80.9	83.9	84.6	84.1

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

All Other Chemicals



DRUGS AND MEDICINES

NUMBER OF PATENTS

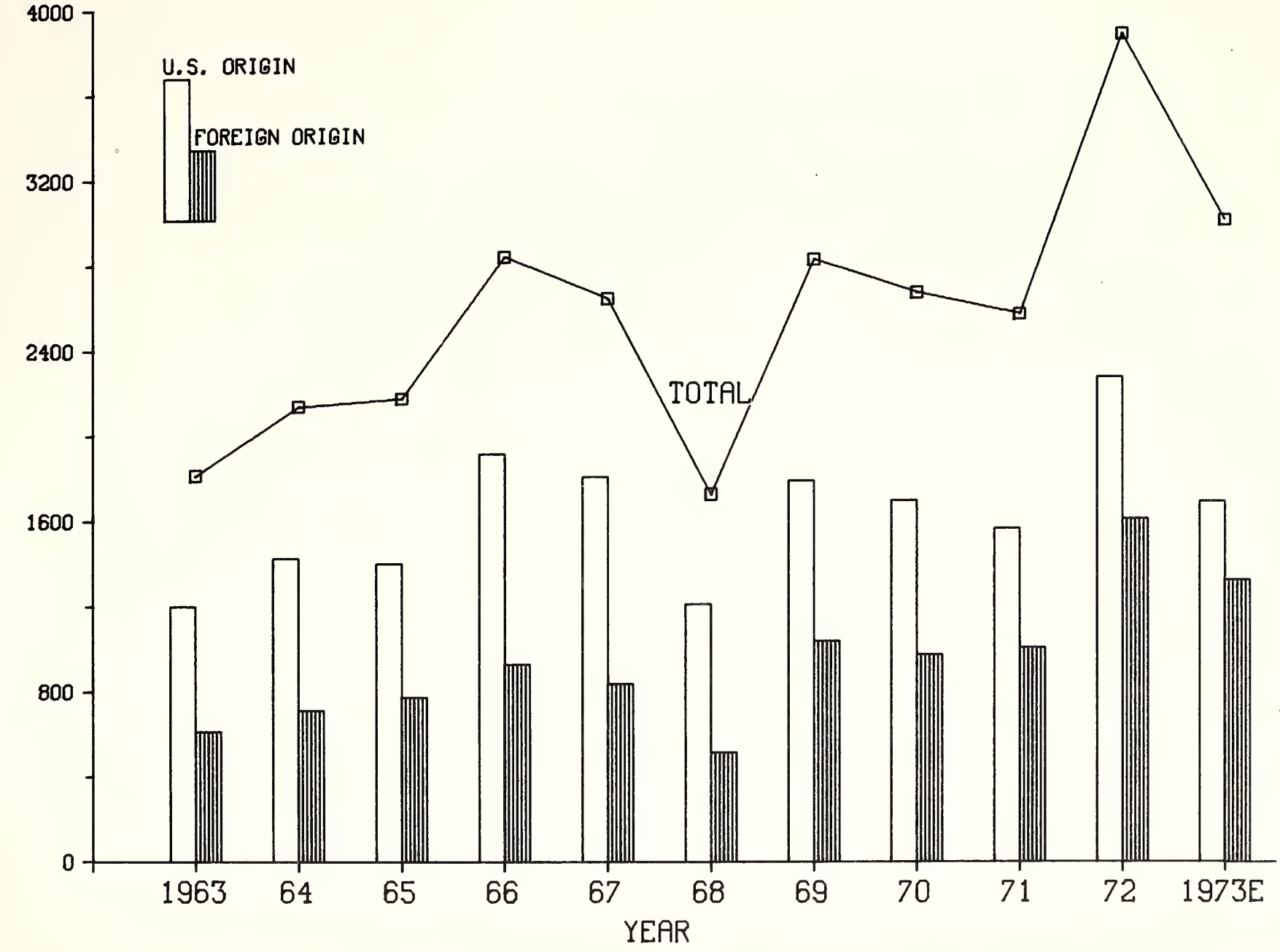
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1814	2139	2176	2841	2646	1726	2831	2676	2576	3896	3020
ORIGINATING IN THE UNITED STATES	1201	1427	1401	1915	1810	1212	1793	1700	1568	2281	1696
ORIGINATING IN OTHER COUNTRIES	613	712	775	926	836	514	1038	976	1008	1615	1324
PATENTS ORIGINATING IN THE UNITED STATES	1201	1427	1401	1915	1810	1212	1793	1700	1568	2281	1696
OWNED BY UNITED STATES CORPORATIONS	1077	1321	1287	1734	1645	1092	1643	1547	1431	1958	1492
OWNED BY UNITED STATES INDIVIDUALS	80	80	90	146	123	61	88	107	105	275	132
OWNED BY UNITED STATES GOVERNMENT	29	20	21	21	25	26	22	16	26	35	56
FOREIGN OWNED	15	6	3	14	17	33	40	30	6	13	16
PATENTS ORIGINATING IN OTHER COUNTRIES	613	712	775	926	836	514	1038	976	1008	1615	1324
UNITED STATES OWNED	113	138	181	186	172	120	225	260	176	253	196
FOREIGN OWNED	500	574	594	740	664	394	813	716	832	1362	1128

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	66.2	66.7	64.4	67.4	68.4	70.2	63.3	63.5	60.9	58.5	56.2
ORIGINATING IN OTHER COUNTRIES	33.8	33.3	35.6	32.6	31.6	29.8	36.7	36.5	39.1	41.5	43.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	89.7	92.6	91.9	90.5	90.9	90.1	91.6	91.0	91.3	85.8	88.0
OWNED BY UNITED STATES INDIVIDUALS	6.6	5.6	6.4	7.7	6.8	5.0	4.9	6.3	6.7	12.1	7.8
OWNED BY UNITED STATES GOVERNMENT	2.5	1.4	1.5	1.1	1.4	2.2	1.3	.9	1.6	1.5	3.3
FOREIGN OWNED	1.2	.4	.2	.7	.9	2.7	2.2	1.8	.4	.6	.9
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	18.4	19.4	23.4	20.1	20.6	23.3	21.7	26.6	17.5	15.7	14.8
FOREIGN OWNED	81.6	80.6	76.6	79.9	79.4	76.7	78.3	73.4	82.5	84.3	85.2

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Drugs and Medicines



PETROLEUM AND NATURAL GAS EXTRACTION AND PETROLEUM REFINING

NUMBER OF PATENTS

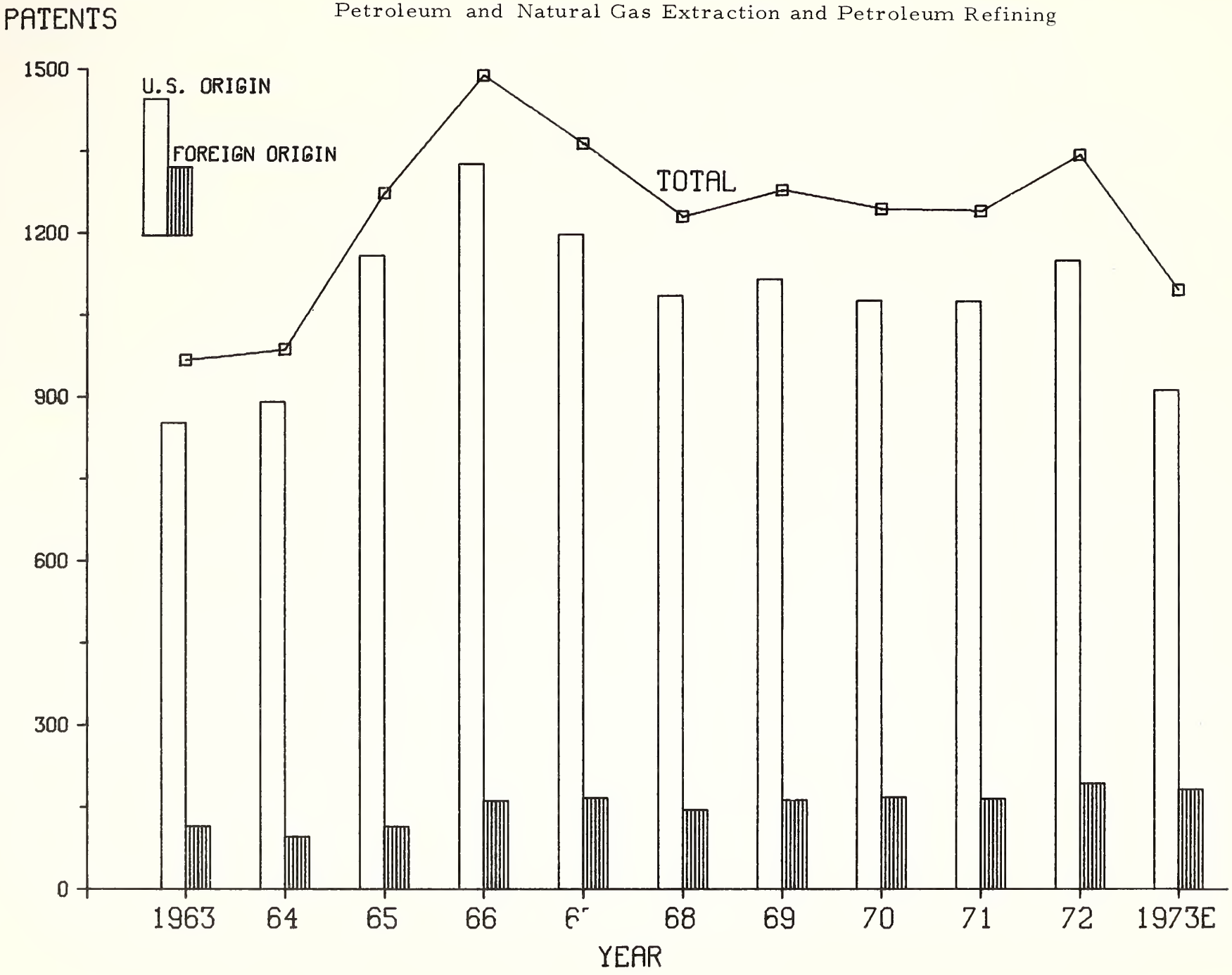
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	967	986	1271	1486	1362	1228	1276	1242	1238	1341	1094
ORIGINATING IN THE UNITED STATES	852	890	1157	1324	1195	1083	1113	1074	1073	1148	912
ORIGINATING IN OTHER COUNTRIES	115	96	114	162	167	145	163	168	165	193	182
PATENTS ORIGINATING IN THE UNITED STATES	852	890	1157	1324	1195	1083	1113	1074	1073	1148	912
OWNED BY UNITED STATES CORPORATIONS	794	829	1060	1234	1084	998	1007	961	972	943	796
OWNED BY UNITED STATES INDIVIDUALS	46	53	88	76	88	63	85	85	73	172	92
OWNED BY UNITED STATES GOVERNMENT	11	5	9	11	17	13	17	17	18	27	18
FOREIGN OWNED	1	3	0	3	6	9	4	11	10	6	6
PATENTS ORIGINATING IN OTHER COUNTRIES	115	96	114	162	167	145	163	168	165	193	182
UNITED STATES OWNED	44	36	46	57	50	46	44	38	60	46	32
FOREIGN OWNED	71	60	68	105	117	99	119	130	105	147	150

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	88.1	90.3	91.0	89.1	87.7	88.2	87.2	86.5	86.7	85.6	83.4
ORIGINATING IN OTHER COUNTRIES	11.9	9.7	9.0	10.9	12.3	11.8	12.8	13.5	13.3	14.4	16.6
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	93.2	93.1	91.6	93.2	90.7	92.2	90.5	89.5	90.6	82.1	87.3
OWNED BY UNITED STATES INDIVIDUALS	5.4	6.0	7.6	5.7	7.4	5.8	7.6	7.9	6.8	15.0	10.1
OWNED BY UNITED STATES GOVERNMENT	1.3	.6	.8	.9	1.4	1.2	1.5	1.6	1.7	2.4	1.9
FOREIGN OWNED	.1	.3	0.0	.2	.5	.8	.4	1.0	.9	.5	.7
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	38.3	37.5	40.4	35.2	29.9	31.7	27.0	22.6	36.4	23.8	17.6
FOREIGN OWNED	61.7	62.5	59.6	64.8	70.1	68.3	73.0	77.4	63.6	76.2	82.4

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Petroleum and Natural Gas Extraction and Petroleum Refining



RUBBER AND MISCELLANEOUS PLASTICS PRODUCTS

NUMBER OF PATENTS

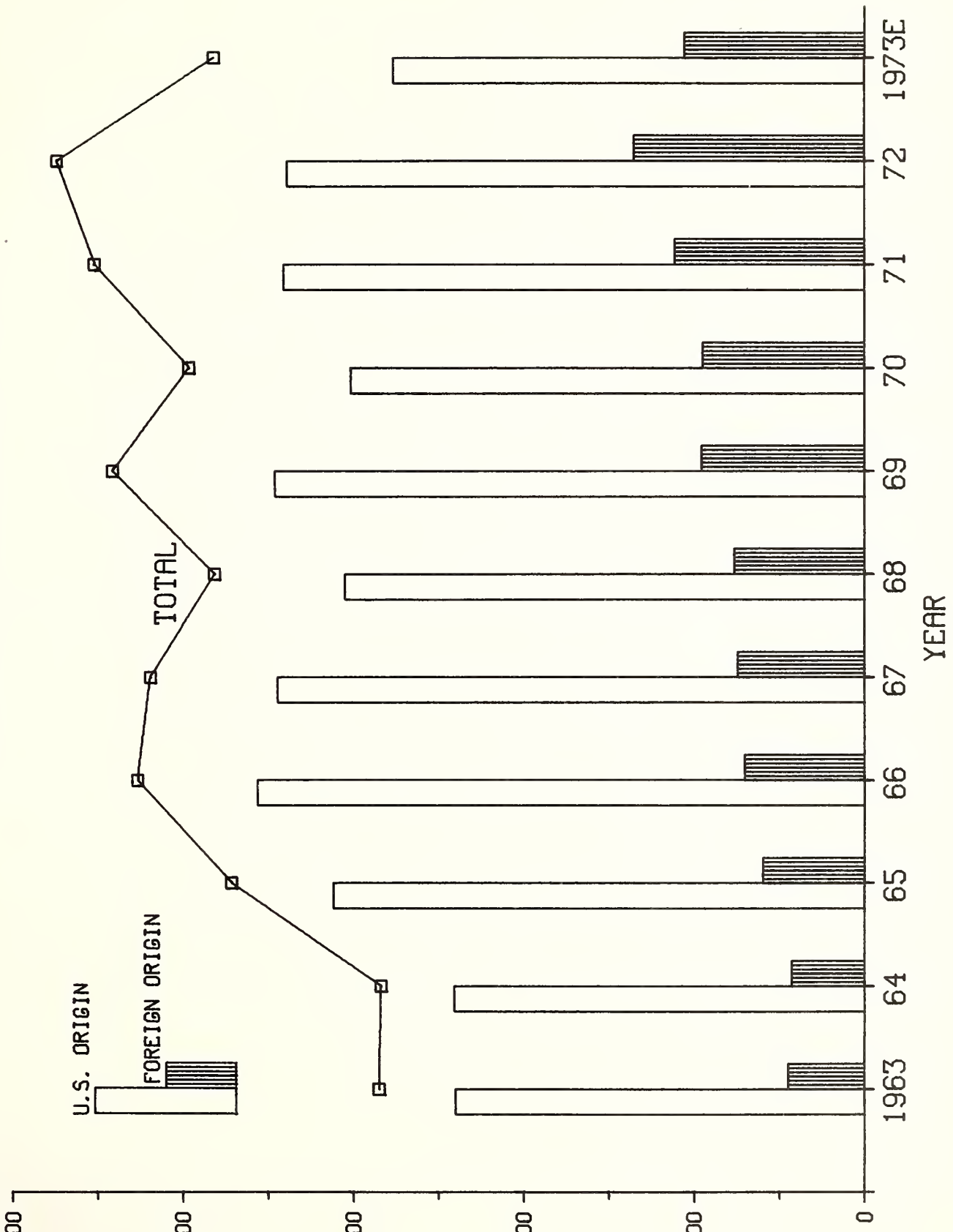
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	5124	5101	6677	7668	7531	6859	7935	7126	8130	8529	6874
ORIGINATING IN THE UNITED STATES	4318	4331	5606	6403	6190	5483	6219	5422	6129	6096	4976
ORIGINATING IN OTHER COUNTRIES	806	770	1071	1265	1341	1376	1716	1704	2001	2433	1898
PATENTS ORIGINATING IN THE UNITED STATES	4318	4331	5606	6403	6190	5483	6219	5422	6129	6096	4976
OWNED BY UNITED STATES CORPORATIONS	2934	2982	3938	4663	4434	4119	4715	4139	4513	4488	3640
OWNED BY UNITED STATES INDIVIDUALS	1303	1239	1530	1602	1589	1224	1330	1118	1435	1397	1200
OWNED BY UNITED STATES GOVERNMENT	74	93	125	115	151	122	155	145	140	171	130
FOREIGN OWNED	7	17	13	23	16	18	19	20	41	40	6
PATENTS ORIGINATING IN OTHER COUNTRIES	806	770	1071	1265	1341	1376	1716	1704	2001	2433	1898
UNITED STATES OWNED	85	82	118	162	168	172	168	169	192	194	160
FOREIGN OWNED	721	688	953	1103	1173	1204	1548	1535	1809	2239	1738

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.3	84.9	84.0	83.5	82.2	79.9	78.4	76.1	75.4	71.5	72.4
ORIGINATING IN OTHER COUNTRIES	15.7	15.1	16.0	16.5	17.8	20.1	21.6	23.9	24.6	28.5	27.6
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	67.9	68.9	70.2	72.8	71.6	75.1	75.8	76.3	73.6	73.6	73.2
OWNED BY UNITED STATES INDIVIDUALS	30.2	28.6	27.3	25.0	25.7	22.3	21.4	20.7	23.4	22.9	24.1
OWNED BY UNITED STATES GOVERNMENT	1.7	2.1	2.3	1.8	2.4	2.3	2.5	2.6	2.3	2.8	2.6
FOREIGN OWNED	.2	.4	.2	.4	.3	.3	.3	.4	.7	.7	.1
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	10.5	10.6	11.0	12.8	12.5	12.5	9.8	9.9	9.6	8.0	8.4
FOREIGN OWNED	89.5	89.4	89.0	87.2	87.5	87.5	90.2	90.1	90.4	92.0	91.6

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Rubber and Miscellaneous Plastics Products



STONE, CLAY, GLASS AND CONCRETE PRODUCTS

NUMBER OF PATENTS

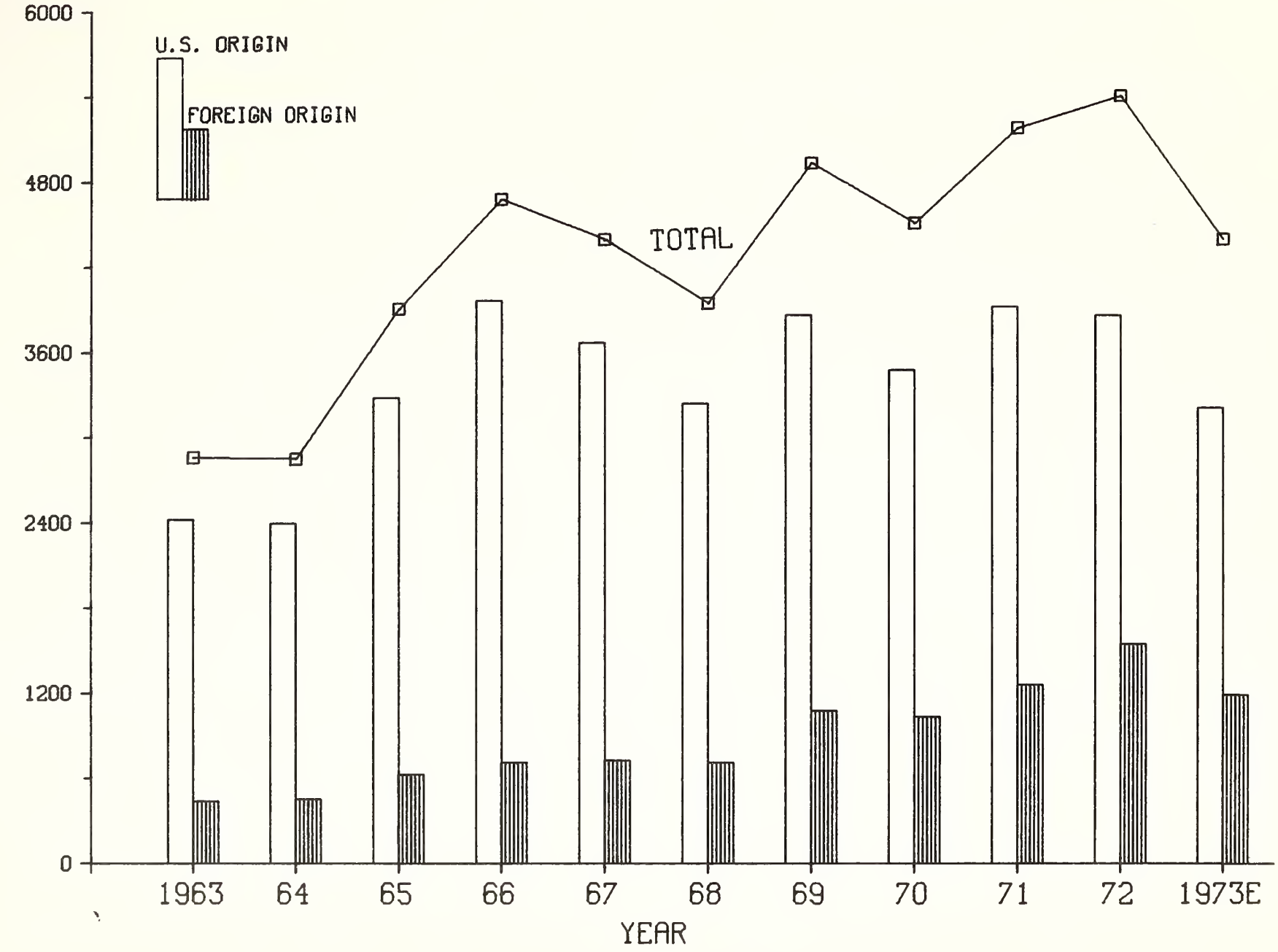
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2858	2847	3904	4674	4391	3944	4933	4509	5181	5410	4396
ORIGINATING IN THE UNITED STATES	2420	2394	3277	3961	3666	3234	3859	3474	3921	3863	3210
ORIGINATING IN OTHER COUNTRIES	438	453	627	713	725	710	1074	1035	1260	1547	1186
PATENTS ORIGINATING IN THE UNITED STATES	2420	2394	3277	3961	3666	3234	3859	3474	3921	3863	3210
OWNED BY UNITED STATES CORPORATIONS	1792	1838	2565	3210	2908	2611	3139	2851	3085	3021	2466
OWNED BY UNITED STATES INDIVIDUALS	567	487	623	669	650	539	603	529	720	724	678
OWNED BY UNITED STATES GOVERNMENT	55	58	86	71	94	75	106	84	90	99	66
FOREIGN OWNED	6	11	3	11	14	9	11	10	26	19	0
PATENTS ORIGINATING IN OTHER COUNTRIES	438	453	627	713	725	710	1074	1035	1260	1547	1186
UNITED STATES OWNED	55	62	88	106	79	79	96	100	117	116	82
FOREIGN OWNED	383	391	539	607	646	631	978	935	1143	1431	1104

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.7	84.1	83.9	84.7	83.5	82.0	78.2	77.0	75.7	71.4	73.0
ORIGINATING IN OTHER COUNTRIES	15.3	15.9	16.1	15.3	16.5	18.0	21.8	23.0	24.3	28.6	27.0
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	74.0	76.8	78.3	81.0	79.3	80.7	81.3	82.1	78.7	78.2	76.8
OWNED BY UNITED STATES INDIVIDUALS	23.5	20.3	19.0	16.9	17.8	16.7	15.7	15.2	18.3	18.7	21.1
OWNED BY UNITED STATES GOVERNMENT	2.3	2.4	2.6	1.8	2.5	2.3	2.7	2.4	2.3	2.6	2.1
FOREIGN OWNED	.2	.5	.1	.3	.4	.3	.3	.3	.7	.5	0.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	12.6	13.7	14.0	14.9	10.9	11.1	8.9	9.7	9.3	7.5	6.9
FOREIGN OWNED	87.4	86.3	86.0	85.1	89.1	88.9	91.1	90.3	90.7	92.5	93.1

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Stone, Clay, Glass and Concrete Products



PRIMARY METALS

NUMBER OF PATENTS

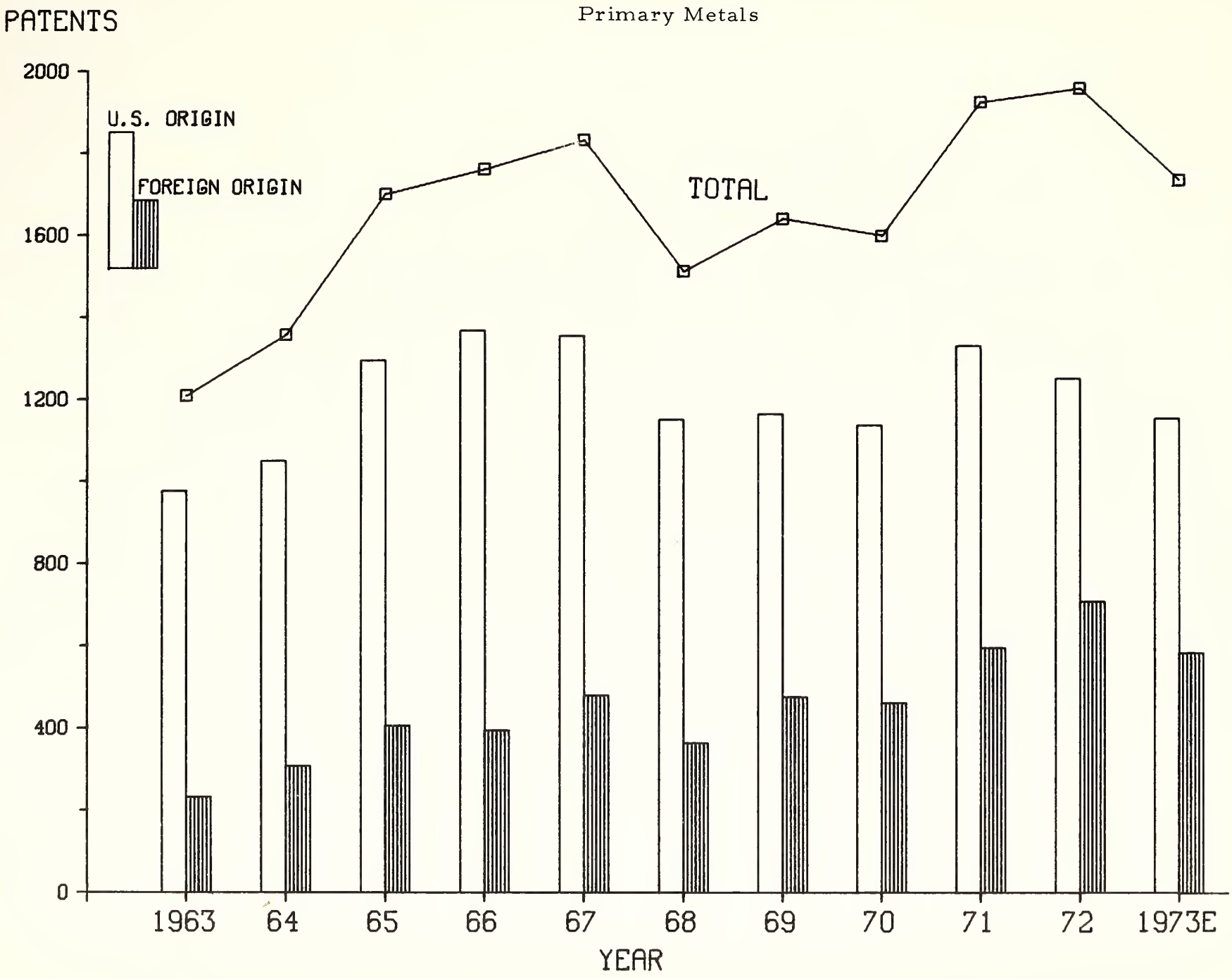
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1208	1356	1699	1759	1831	1511	1638	1597	1925	1959	1736
ORIGINATING IN THE UNITED STATES	976	1049	1293	1366	1353	1149	1163	1136	1330	1251	1154
ORIGINATING IN OTHER COUNTRIES	232	307	406	393	478	362	475	461	595	708	582
PATENTS ORIGINATING IN THE UNITED STATES	976	1049	1293	1366	1353	1149	1163	1136	1330	1251	1154
OWNED BY UNITED STATES CORPORATIONS	716	806	998	1053	1045	923	887	889	1051	976	880
OWNED BY UNITED STATES INDIVIDUALS	209	183	226	247	234	174	216	199	205	223	222
OWNED BY UNITED STATES GOVERNMENT	47	54	65	61	67	43	54	43	64	44	44
FOREIGN OWNED	4	6	4	5	7	9	6	5	10	8	8
PATENTS ORIGINATING IN OTHER COUNTRIES	232	307	406	393	478	362	475	461	595	708	582
UNITED STATES OWNED	22	30	43	50	52	37	38	52	51	51	32
FOREIGN OWNED	210	277	363	343	426	325	437	409	544	657	550

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.8	77.4	76.1	77.7	73.9	76.0	71.0	71.1	69.1	63.9	66.5
ORIGINATING IN OTHER COUNTRIES	19.2	22.6	23.9	22.3	26.1	24.0	29.0	28.9	30.9	36.1	33.5
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	73.4	76.8	77.2	77.1	77.2	80.3	76.3	78.3	79.0	78.0	76.3
OWNED BY UNITED STATES INDIVIDUALS	21.4	17.5	17.5	18.1	17.3	15.2	18.5	17.5	15.4	17.8	19.2
OWNED BY UNITED STATES GOVERNMENT	4.8	5.1	5.0	4.4	5.0	3.7	4.7	3.8	4.8	3.6	3.8
FOREIGN OWNED	.4	.6	.3	.4	.5	.8	.5	.4	.8	.6	.7
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	9.5	9.8	10.6	12.7	10.9	10.2	8.0	11.3	8.6	7.2	5.5
FOREIGN OWNED	90.5	90.2	89.4	87.3	89.1	89.8	92.0	88.7	91.4	92.8	94.5

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Primary Metals



PRIMARY FERROUS PRODUCTS

NUMBER OF PATENTS

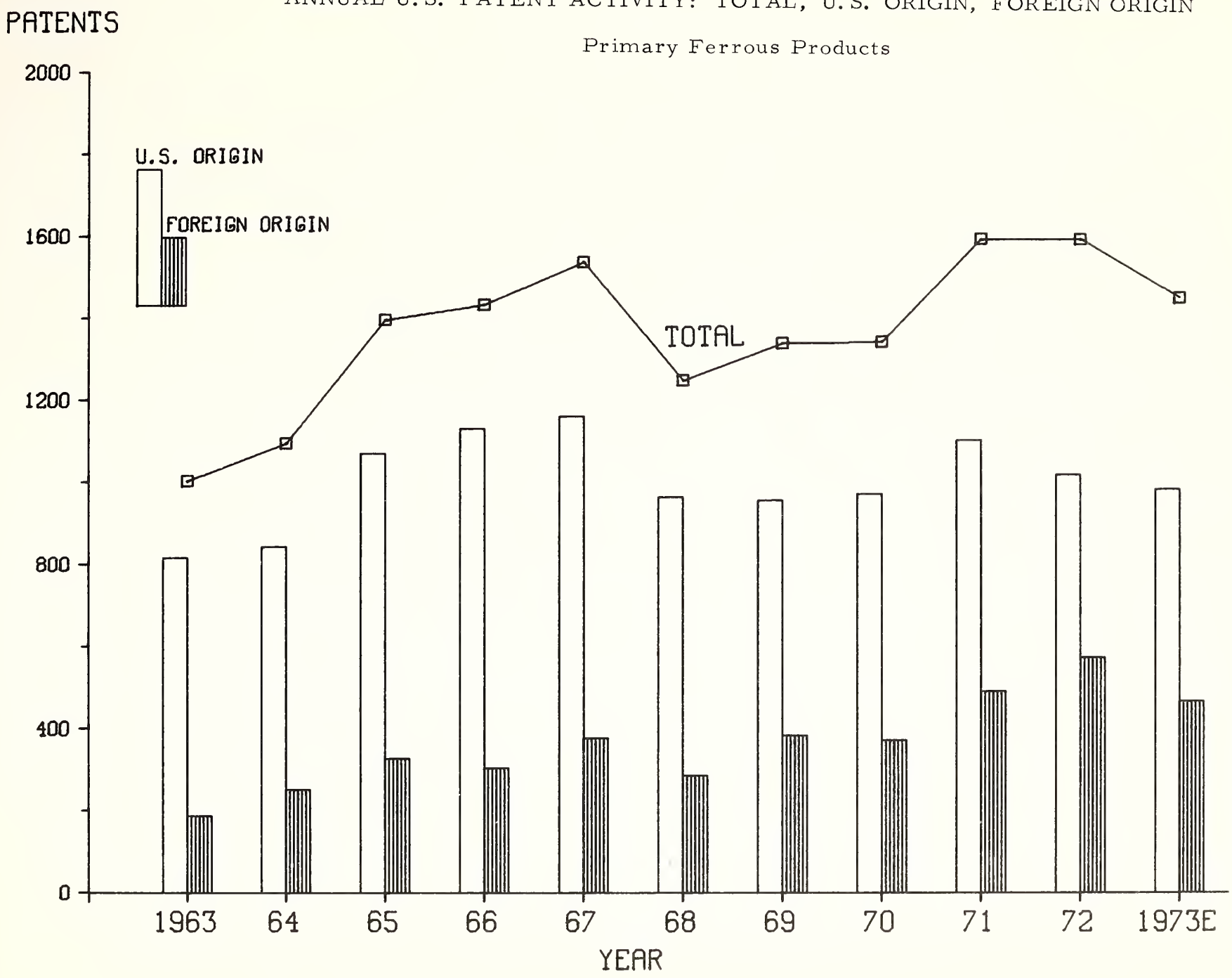
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1003	1094	1395	1432	1535	1247	1337	1340	1591	1590	1448
ORIGINATING IN THE UNITED STATES	816	843	1069	1129	1159	963	954	969	1101	1018	982
ORIGINATING IN OTHER COUNTRIES	187	251	326	303	376	284	383	371	490	572	466
PATENTS ORIGINATING IN THE UNITED STATES	816	843	1069	1129	1159	963	954	969	1101	1018	982
OWNED BY UNITED STATES CORPORATIONS	606	648	825	871	887	768	739	764	868	796	736
OWNED BY UNITED STATES INDIVIDUALS	171	154	194	214	210	155	173	171	178	184	200
OWNED BY UNITED STATES GOVERNMENT	35	36	46	40	55	32	36	31	46	32	38
FOREIGN OWNED	4	5	4	4	7	8	6	3	9	6	8
PATENTS ORIGINATING IN OTHER COUNTRIES	187	251	326	303	376	284	383	371	490	572	466
UNITED STATES OWNED	15	21	28	40	39	28	31	40	36	39	22
FOREIGN OWNED	172	230	298	263	337	256	352	331	454	533	444

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	81.4	77.1	76.6	78.8	75.5	77.2	71.4	72.3	69.2	64.0	67.8
ORIGINATING IN OTHER COUNTRIES	18.6	22.9	23.4	21.2	24.5	22.8	28.6	27.7	30.8	36.0	32.2
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	74.3	76.9	77.2	77.1	76.5	79.8	77.5	78.8	78.8	78.2	74.9
OWNED BY UNITED STATES INDIVIDUALS	20.9	18.2	18.1	19.0	18.2	16.0	18.1	17.7	16.2	18.1	20.4
OWNED BY UNITED STATES GOVERNMENT	4.3	4.3	4.3	3.5	4.7	3.4	3.8	3.2	4.2	3.1	3.9
FOREIGN OWNED	.5	.6	.4	.4	.6	.8	.6	.3	.8	.6	.8
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.0	8.4	8.6	13.2	10.4	9.9	8.1	10.8	7.3	6.8	4.7
FOREIGN OWNED	92.0	91.6	91.4	86.8	89.6	90.1	91.9	89.2	92.7	93.2	95.3

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Primary Ferrous Products



PRIMARY AND SECONDARY NONFERROUS METALS

NUMBER OF PATENTS

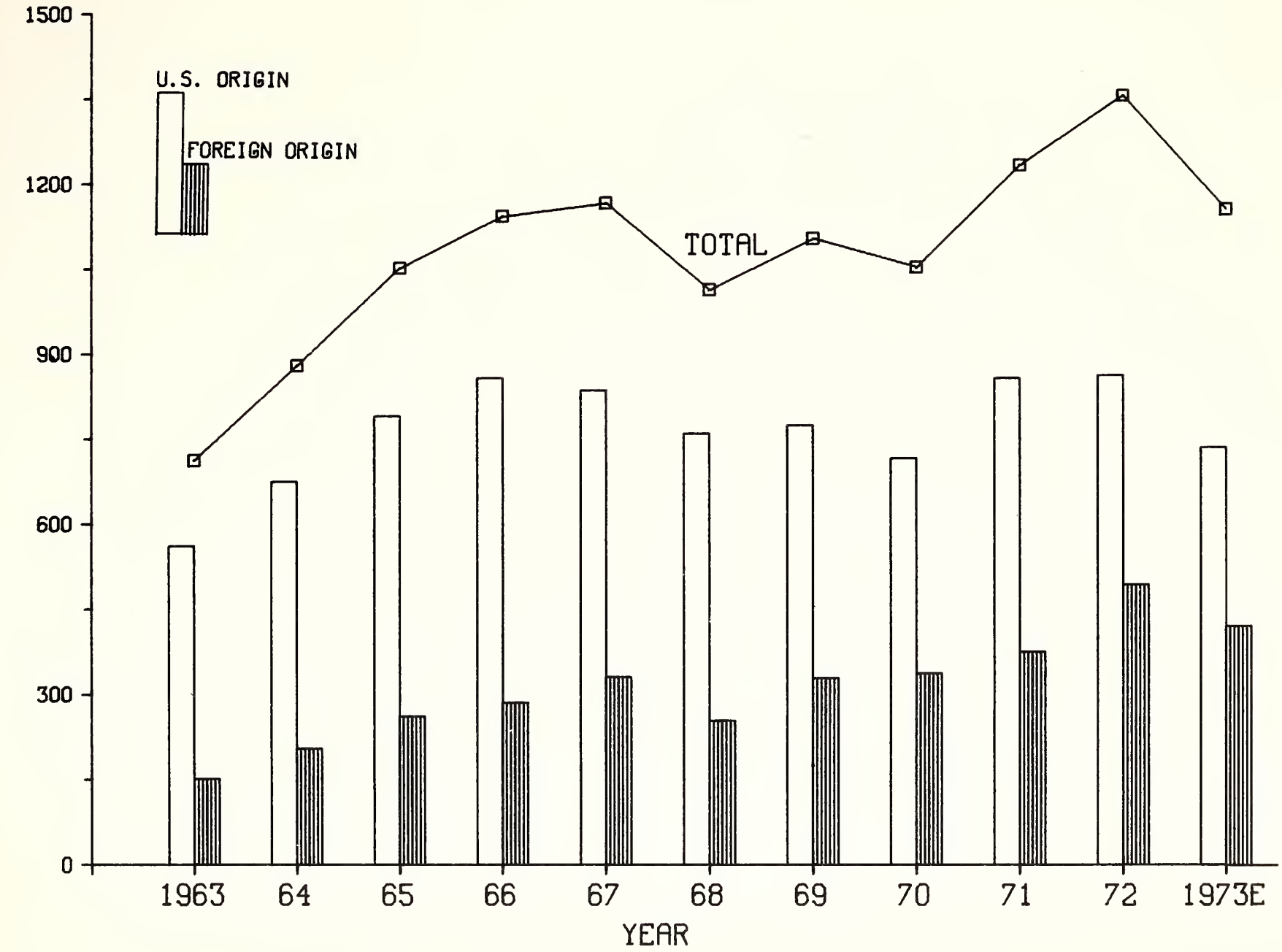
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	712	878	1050	1141	1164	1011	1101	1051	1231	1354	1154
ORIGINATING IN THE UNITED STATES	561	674	789	856	834	758	773	715	856	861	734
ORIGINATING IN OTHER COUNTRIES	151	204	261	285	330	253	328	336	375	493	420
PATENTS ORIGINATING IN THE UNITED STATES	561	674	789	856	834	758	773	715	856	861	734
OWNED BY UNITED STATES CORPORATIONS	435	546	626	688	674	644	624	578	693	693	590
OWNED BY UNITED STATES INDIVIDUALS	89	79	109	117	99	72	106	99	105	121	104
OWNED BY UNITED STATES GOVERNMENT	35	46	52	50	57	38	41	33	50	42	32
FOREIGN OWNED	2	3	2	1	4	4	2	5	8	5	8
PATENTS ORIGINATING IN OTHER COUNTRIES	151	204	261	285	330	253	328	336	375	493	420
UNITED STATES OWNED	18	24	32	37	42	32	30	46	36	37	22
FOREIGN OWNED	133	180	229	248	288	221	298	290	339	456	398

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	78.8	76.8	75.1	75.0	71.6	75.0	70.2	68.0	69.5	63.6	63.6
ORIGINATING IN OTHER COUNTRIES	21.2	23.2	24.9	25.0	28.4	25.0	29.8	32.0	30.5	36.4	36.4
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	77.5	81.0	79.3	80.4	80.8	85.0	80.7	80.8	81.0	80.5	80.4
OWNED BY UNITED STATES INDIVIDUALS	15.9	11.7	13.9	13.6	11.9	9.5	13.7	13.9	12.2	14.0	14.2
OWNED BY UNITED STATES GOVERNMENT	6.2	6.9	6.5	5.9	6.8	5.0	5.3	4.6	5.9	4.9	4.3
FOREIGN OWNED	.4	.4	.3	.1	.5	.5	.3	.7	.9	.6	1.1
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	11.9	11.8	12.3	13.0	12.7	12.6	9.1	13.7	9.6	7.5	5.2
FOREIGN OWNED	88.1	88.2	87.7	87.0	87.3	87.4	90.9	86.3	90.4	92.5	94.8

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Primary and Secondary Nonferrous Metals



FABRICATED METAL PRODUCTS

NUMBER OF PATENTS

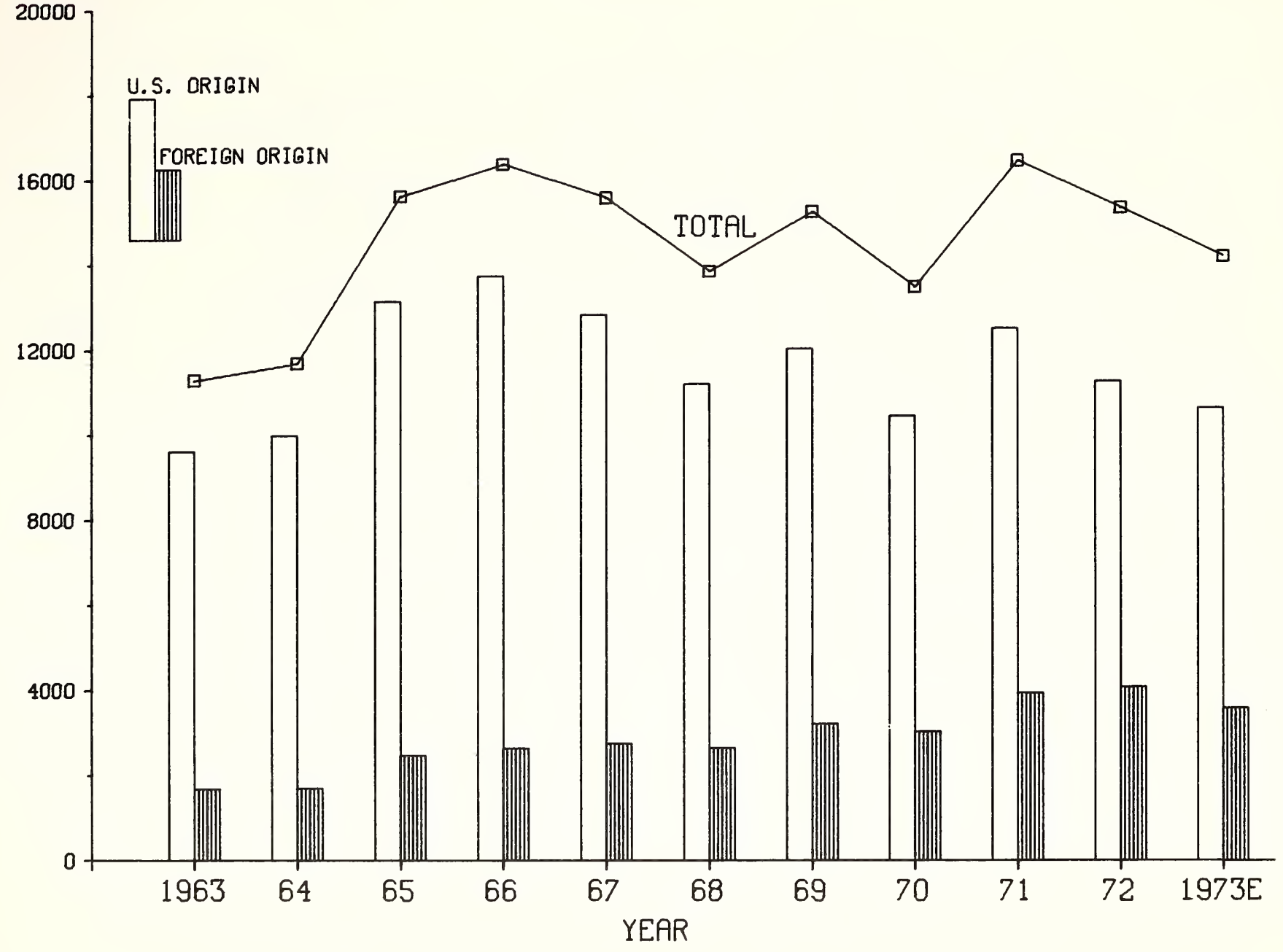
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	11292	11687	15617	16376	15580	13852	15259	13486	16468	15363	14228
ORIGINATING IN THE UNITED STATES	9613	9988	13151	13739	12833	11205	12045	10453	12525	11283	10650
ORIGINATING IN OTHER COUNTRIES	1679	1699	2466	2637	2747	2647	3214	3033	3943	4080	3578
PATENTS ORIGINATING IN THE UNITED STATES	9613	9988	13151	13739	12833	11205	12045	10453	12525	11283	10650
OWNED BY UNITED STATES CORPORATIONS	6094	6387	8675	9180	8423	7703	8413	7318	8522	7634	7056
OWNED BY UNITED STATES INDIVIDUALS	3277	3337	4179	4243	4053	3219	3317	2805	3618	3345	3334
OWNED BY UNITED STATES GOVERNMENT	217	230	286	279	322	242	277	285	294	244	220
FOREIGN OWNED	25	34	11	37	35	41	38	45	91	60	40
PATENTS ORIGINATING IN OTHER COUNTRIES	1679	1699	2466	2637	2747	2647	3214	3033	3943	4080	3578
UNITED STATES OWNED	144	178	255	322	289	267	294	275	337	301	232
FOREIGN OWNED	1535	1521	2211	2315	2458	2380	2920	2758	3606	3779	3346

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	85.1	85.5	84.2	83.9	82.4	80.9	78.9	77.5	76.1	73.4	74.9
ORIGINATING IN OTHER COUNTRIES	14.9	14.5	15.8	16.1	17.6	19.1	21.1	22.5	23.9	26.6	25.1
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	63.4	63.9	66.0	66.8	65.6	68.7	69.8	70.0	68.0	67.7	66.3
OWNED BY UNITED STATES INDIVIDUALS	34.1	33.5	31.7	30.9	31.6	28.8	27.6	26.8	28.9	29.6	31.3
OWNED BY UNITED STATES GOVERNMENT	2.2	2.3	2.2	2.0	2.5	2.1	2.3	2.8	2.4	2.2	2.0
FOREIGN OWNED	.3	.3	.1	.3	.3	.4	.3	.4	.7	.5	.4
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.6	10.5	10.3	12.2	10.5	10.1	9.1	9.1	8.5	7.4	6.5
FOREIGN OWNED	91.4	89.5	89.7	87.8	89.5	89.9	90.9	90.9	91.5	92.6	93.5

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Fabricated Metal Products



MACHINERY, EXCEPT ELECTRICAL

NUMBER OF PATENTS

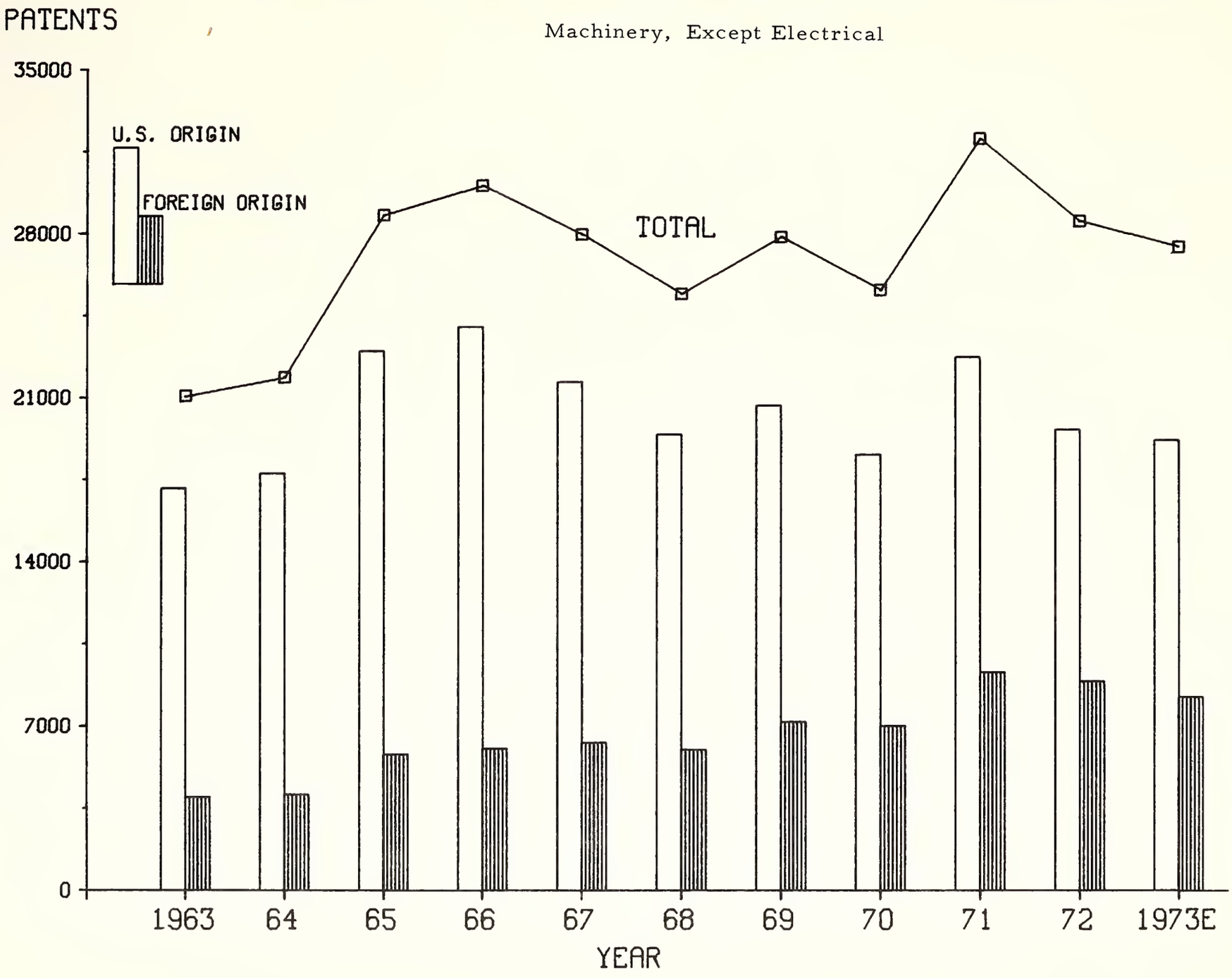
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	21054	21840	28762	30024	27939	25412	27828	25571	32055	28538	27438
ORIGINATING IN THE UNITED STATES	17096	17756	22974	23988	21651	19420	20647	18560	22752	19636	19206
ORIGINATING IN OTHER COUNTRIES	3958	4084	5788	6036	6288	5992	7181	7011	9303	8902	8232
PATENTS ORIGINATING IN THE UNITED STATES	17096	17756	22974	23988	21651	19420	20647	18560	22752	19636	19206
OWNED BY UNITED STATES CORPORATIONS	11873	12330	16145	17291	15307	14075	15049	13678	16553	13895	13640
OWNED BY UNITED STATES INDIVIDUALS	4902	5047	6331	6175	5791	4901	5118	4334	5535	5215	5072
OWNED BY UNITED STATES GOVERNMENT	288	328	453	433	484	368	399	435	478	392	384
FOREIGN OWNED	33	51	45	89	69	76	81	113	186	134	110
PATENTS ORIGINATING IN OTHER COUNTRIES	3958	4084	5788	6036	6288	5992	7181	7011	9303	8902	8232
UNITED STATES OWNED	352	400	527	620	563	611	617	672	790	605	550
FOREIGN OWNED	3606	3684	5261	5416	5725	5381	6564	6339	8513	8297	7682

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	81.2	81.3	79.9	79.9	77.5	76.4	74.2	72.6	71.0	68.8	70.0
ORIGINATING IN OTHER COUNTRIES	18.8	18.7	20.1	20.1	22.5	23.6	25.8	27.4	29.0	31.2	30.0
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	69.4	69.4	70.3	72.1	70.7	72.5	72.9	73.7	72.8	70.8	71.0
OWNED BY UNITED STATES INDIVIDUALS	28.7	28.5	27.5	25.7	26.7	25.2	24.8	23.3	24.3	26.5	26.4
OWNED BY UNITED STATES GOVERNMENT	1.7	1.8	2.0	1.8	2.3	1.9	1.9	2.4	2.1	2.0	2.0
FOREIGN OWNED	.2	.3	.2	.4	.3	.4	.4	.6	.8	.7	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.9	9.8	9.1	10.3	9.0	10.2	8.6	9.6	8.5	6.8	6.7
FOREIGN OWNED	91.1	90.2	90.9	89.7	91.0	89.8	91.4	90.4	91.5	93.2	93.3

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Machinery, Except Electrical



ENGINES AND TURBINES

NUMBER OF PATENTS

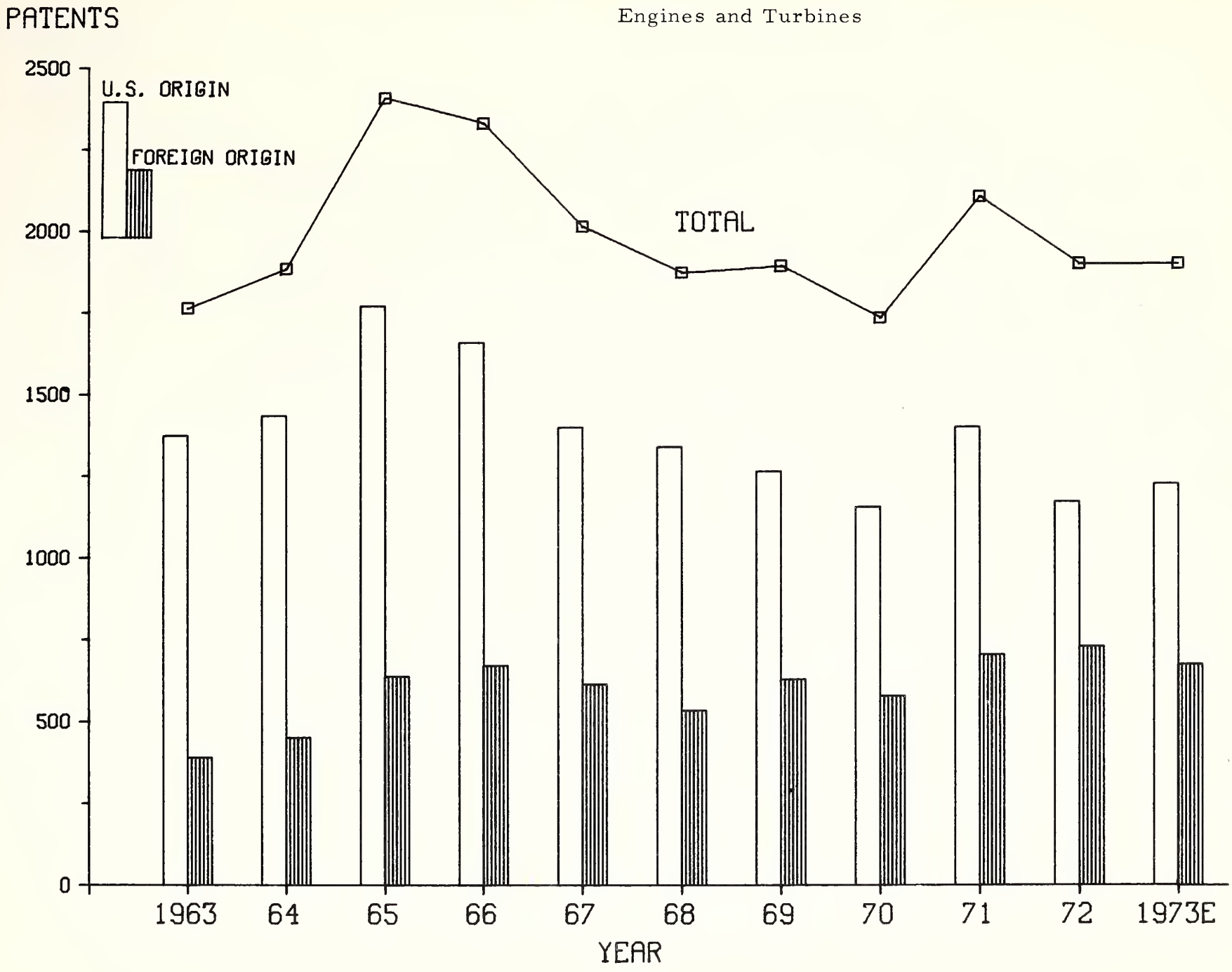
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1762	1882	2404	2326	2010	1869	1890	1731	2103	1899	1900
ORIGINATING IN THE UNITED STATES	1373	1432	1768	1656	1397	1336	1262	1154	1399	1171	1226
ORIGINATING IN OTHER COUNTRIES	389	450	636	670	613	533	628	577	704	728	674
PATENTS ORIGINATING IN THE UNITED STATES	1373	1432	1768	1656	1397	1336	1262	1154	1399	1171	1226
OWNED BY UNITED STATES CORPORATIONS	961	976	1174	1158	941	966	871	795	980	772	828
OWNED BY UNITED STATES INDIVIDUALS	371	415	504	414	377	323	326	312	349	339	306
OWNED BY UNITED STATES GOVERNMENT	37	38	88	72	75	43	61	40	61	52	78
FOREIGN OWNED	4	3	2	12	4	4	4	7	9	8	14
PATENTS ORIGINATING IN OTHER COUNTRIES	389	450	636	670	613	533	628	577	704	728	674
UNITED STATES OWNED	15	23	32	33	35	34	28	33	37	35	30
FOREIGN OWNED	374	427	604	637	578	499	600	544	667	693	644

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	77.9	76.1	73.5	71.2	69.5	71.5	66.8	66.7	66.5	61.7	64.5
ORIGINATING IN OTHER COUNTRIES	22.1	23.9	26.5	28.8	30.5	28.5	33.2	33.3	33.5	38.3	35.5
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	70.0	68.2	66.4	69.9	67.4	72.3	69.0	68.9	70.1	65.9	67.5
OWNED BY UNITED STATES INDIVIDUALS	27.0	28.9	28.5	25.0	26.9	24.2	25.8	27.0	24.9	29.0	25.0
OWNED BY UNITED STATES GOVERNMENT	2.7	2.7	5.0	4.4	5.4	3.2	4.9	3.5	4.4	4.4	6.4
FOREIGN OWNED	.3	.2	.1	.7	.3	.3	.3	.6	.6	.7	1.1
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	3.9	5.1	5.0	4.9	5.7	6.4	4.5	5.7	5.3	4.8	4.5
FOREIGN OWNED	96.1	94.9	95.0	95.1	94.3	93.6	95.5	94.3	94.7	95.2	95.5

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Engines and Turbines



FARM AND GARDEN MACHINERY AND EQUIPMENT

NUMBER OF PATENTS

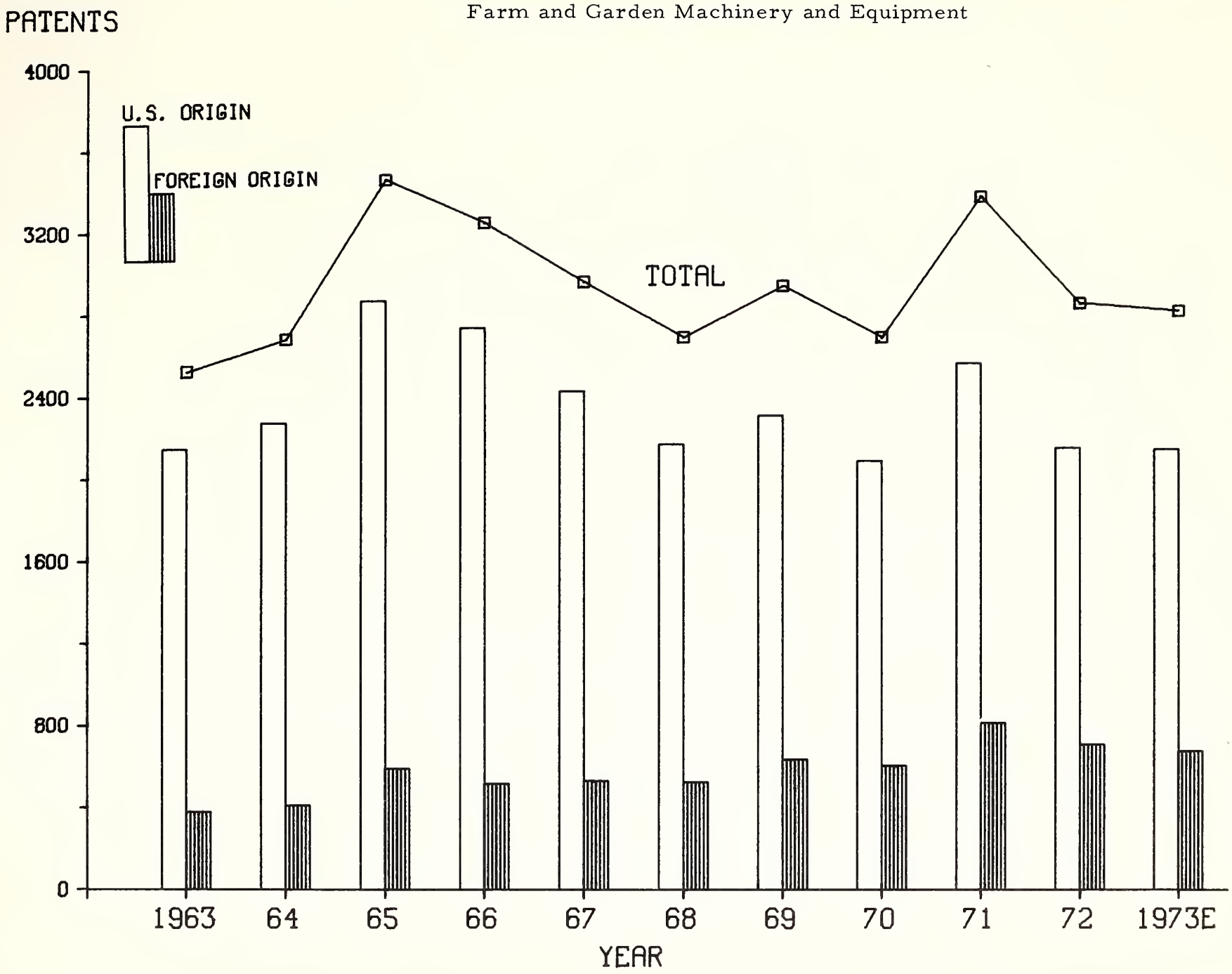
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2526	2687	3466	3257	2967	2697	2949	2697	3386	2865	2828
ORIGINATING IN THE UNITED STATES	2147	2276	2875	2741	2435	2173	2314	2093	2571	2157	2152
ORIGINATING IN OTHER COUNTRIES	379	411	591	516	532	524	635	604	815	708	676
PATENTS ORIGINATING IN THE UNITED STATES	2147	2276	2875	2741	2435	2173	2314	2093	2571	2157	2152
OWNED BY UNITED STATES CORPORATIONS	1162	1256	1620	1597	1394	1355	1437	1275	1565	1260	1304
OWNED BY UNITED STATES INDIVIDUALS	962	990	1218	1096	1004	791	846	788	958	858	806
OWNED BY UNITED STATES GOVERNMENT	21	22	30	31	28	21	23	20	27	22	20
FOREIGN OWNED	2	8	7	17	9	6	8	10	21	17	22
PATENTS ORIGINATING IN OTHER COUNTRIES	379	411	591	516	532	524	635	604	815	708	676
UNITED STATES OWNED	33	34	57	51	42	58	61	72	72	55	50
FOREIGN OWNED	346	377	534	465	490	466	574	532	743	653	626

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	85.0	84.7	82.9	84.2	82.1	80.6	78.5	77.6	75.9	75.3	76.1
ORIGINATING IN OTHER COUNTRIES	15.0	15.3	17.1	15.8	17.9	19.4	21.5	22.4	24.1	24.7	23.9
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	54.1	55.2	56.3	58.3	57.2	62.4	62.1	60.9	60.9	58.4	60.6
OWNED BY UNITED STATES INDIVIDUALS	44.8	43.5	42.4	39.9	41.3	36.4	36.6	37.7	37.2	39.8	37.4
OWNED BY UNITED STATES GOVERNMENT	1.0	.9	1.1	1.2	1.1	.9	1.0	.9	1.1	1.0	1.0
FOREIGN OWNED	.1	.4	.2	.6	.4	.3	.3	.5	.8	.8	1.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.7	8.3	9.6	9.9	7.9	11.1	9.6	11.9	8.8	7.8	7.4
FOREIGN OWNED	91.3	91.7	90.4	90.1	92.1	88.9	90.4	88.1	91.2	92.2	92.6

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Farm and Garden Machinery and Equipment



CONSTRUCTION, MINING AND MATERIALS HANDLING MACHINERY AND EQUIPMENT

NUMBER OF PATENTS

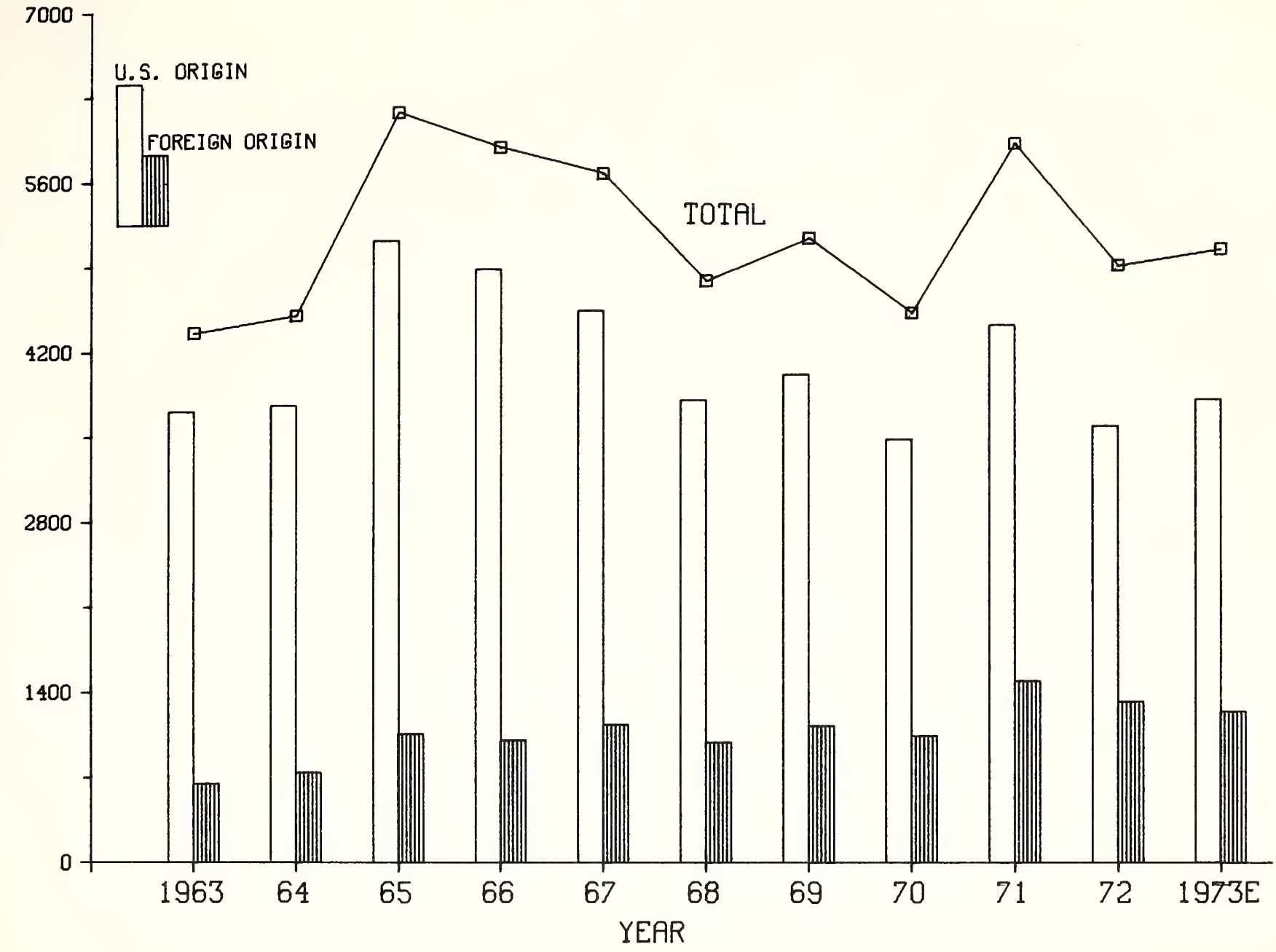
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	4359	4504	6181	5891	5678	4792	5142	4525	5923	4919	5056
ORIGINATING IN THE UNITED STATES	3710	3761	5124	4885	4545	3805	4018	3485	4426	3596	3814
ORIGINATING IN OTHER COUNTRIES	649	743	1057	1006	1133	987	1124	1040	1497	1323	1242
PATENTS ORIGINATING IN THE UNITED STATES	3710	3761	5124	4885	4545	3805	4018	3485	4426	3596	3814
OWNED BY UNITED STATES CORPORATIONS	2283	2311	3175	3079	2815	2430	2618	2321	2889	2256	2448
OWNED BY UNITED STATES INDIVIDUALS	1359	1387	1873	1731	1658	1317	1338	1097	1440	1279	1300
OWNED BY UNITED STATES GOVERNMENT	57	51	66	58	56	46	49	50	56	35	36
FOREIGN OWNED	11	12	10	17	16	12	13	17	41	26	30
PATENTS ORIGINATING IN OTHER COUNTRIES	649	743	1057	1006	1133	987	1124	1040	1497	1323	1242
UNITED STATES OWNED	58	60	93	89	80	98	82	105	125	91	64
FOREIGN OWNED	591	683	964	917	1053	889	1042	935	1372	1232	1178

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	85.1	83.5	82.9	82.9	80.0	79.4	78.1	77.0	74.7	73.1	75.4
ORIGINATING IN OTHER COUNTRIES	14.9	16.5	17.1	17.1	20.0	20.6	21.9	23.0	25.3	26.9	24.6
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	61.5	61.4	62.0	63.0	61.9	63.9	65.2	66.6	65.3	62.7	64.2
OWNED BY UNITED STATES INDIVIDUALS	36.7	36.9	36.5	35.5	36.5	34.6	33.3	31.5	32.5	35.6	34.1
OWNED BY UNITED STATES GOVERNMENT	1.5	1.4	1.3	1.2	1.2	1.2	1.2	1.4	1.3	1.0	.9
FOREIGN OWNED	.3	.3	.2	.3	.4	.3	.3	.5	.9	.7	.8
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.9	8.1	8.8	8.8	7.1	9.9	7.3	10.1	8.4	6.9	5.2
FOREIGN OWNED	91.1	91.9	91.2	91.2	92.9	90.1	92.7	89.9	91.6	93.1	94.8

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Construction, Mining and Materials Handling Machinery and Equipment



METALWORKING MACHINERY AND EQUIPMENT

NUMBER OF PATENTS

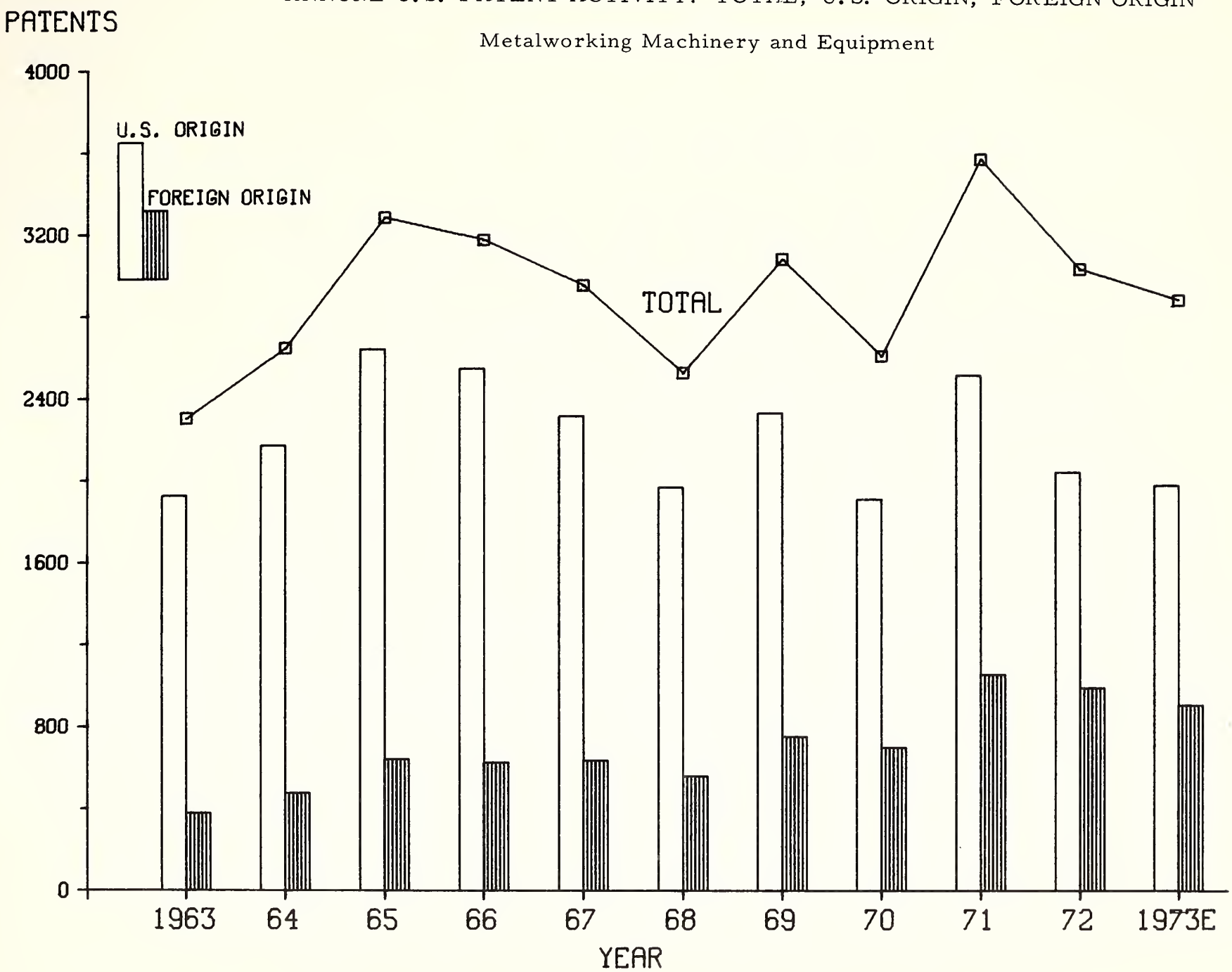
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2303	2647	3283	3173	2952	2525	3079	2607	3567	3031	2880
ORIGINATING IN THE UNITED STATES	1925	2170	2642	2547	2315	1967	2328	1909	2513	2041	1976
ORIGINATING IN OTHER COUNTRIES	378	477	641	626	637	558	751	698	1054	990	904
PATENTS ORIGINATING IN THE UNITED STATES	1925	2170	2642	2547	2315	1967	2328	1909	2513	2041	1976
OWNED BY UNITED STATES CORPORATIONS	1340	1509	1839	1852	1620	1411	1701	1390	1766	1417	1342
OWNED BY UNITED STATES INDIVIDUALS	562	628	781	663	658	512	594	480	700	595	610
OWNED BY UNITED STATES GOVERNMENT	18	23	19	24	33	34	29	29	32	13	10
FOREIGN OWNED	5	10	3	8	4	10	4	10	15	16	14
PATENTS ORIGINATING IN OTHER COUNTRIES	378	477	641	626	637	558	751	698	1054	990	904
UNITED STATES OWNED	31	39	53	62	41	52	52	48	58	56	46
FOREIGN OWNED	347	438	588	564	596	506	699	650	996	934	858

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	83.6	82.0	80.5	80.3	78.4	77.9	75.6	73.2	70.5	67.3	68.6
ORIGINATING IN OTHER COUNTRIES	16.4	18.0	19.5	19.7	21.6	22.1	24.4	26.8	29.5	32.7	31.4
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	69.6	69.5	69.6	72.7	70.0	71.7	73.1	72.8	70.3	69.4	67.9
OWNED BY UNITED STATES INDIVIDUALS	29.2	29.0	29.6	26.0	28.4	26.1	25.5	25.2	27.8	29.2	30.9
OWNED BY UNITED STATES GOVERNMENT	.9	1.0	.7	1.0	1.4	1.7	1.2	1.5	1.3	.6	.5
FOREIGN OWNED	.3	.5	.1	.3	.2	.5	.2	.5	.6	.8	.7
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.2	8.2	8.3	9.9	6.4	9.3	6.9	6.9	5.5	5.7	5.1
FOREIGN OWNED	91.8	91.8	91.7	90.1	93.6	90.7	93.1	93.1	94.5	94.3	94.9

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Metalworking Machinery and Equipment



OFFICE, COMPUTING AND ACCOUNTING MACHINES

NUMBER OF PATENTS

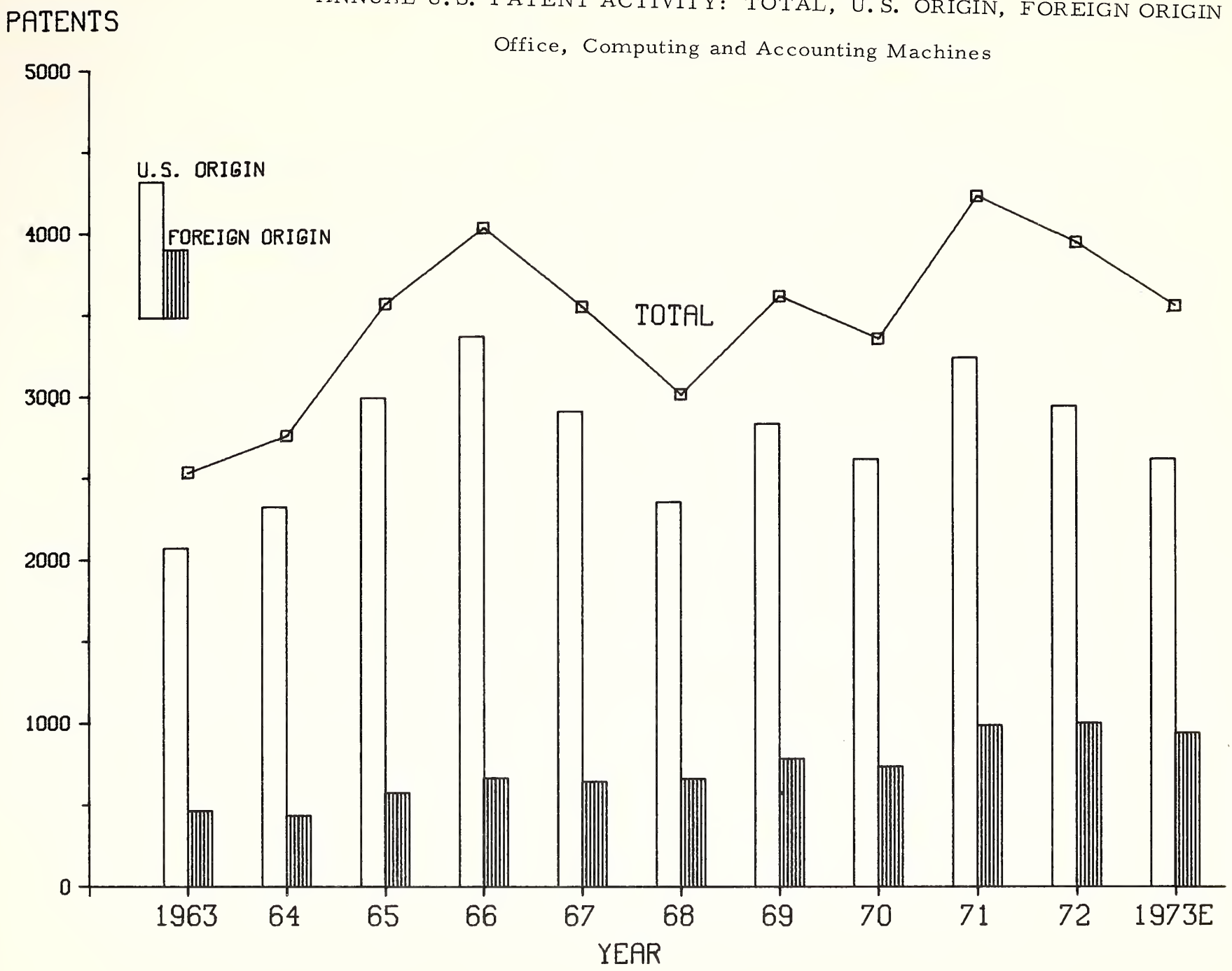
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2534	2759	3566	4030	3548	3010	3611	3349	4222	3941	3554
ORIGINATING IN THE UNITED STATES	2071	2325	2992	3367	2907	2352	2830	2615	3235	2940	2616
ORIGINATING IN OTHER COUNTRIES	463	434	574	663	641	658	781	734	987	1001	938
PATENTS ORIGINATING IN THE UNITED STATES	2071	2325	2992	3367	2907	2352	2830	2615	3235	2940	2616
OWNED BY UNITED STATES CORPORATIONS	1646	1875	2425	2741	2353	1903	2338	2179	2677	2430	2124
OWNED BY UNITED STATES INDIVIDUALS	361	373	472	528	428	349	382	314	433	404	412
OWNED BY UNITED STATES GOVERNMENT	62	75	90	89	119	91	99	114	104	88	66
FOREIGN OWNED	2	2	5	9	7	9	11	8	21	18	14
PATENTS ORIGINATING IN OTHER COUNTRIES	463	434	574	663	641	658	781	734	987	1001	938
UNITED STATES OWNED	66	88	112	124	97	112	126	118	154	85	126
FOREIGN OWNED	397	346	462	539	544	546	655	616	833	916	812

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	81.7	84.3	83.9	83.5	81.9	78.1	78.4	78.1	76.6	74.6	73.6
ORIGINATING IN OTHER COUNTRIES	18.3	15.7	16.1	16.5	18.1	21.9	21.6	21.9	23.4	25.4	26.4
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	79.5	80.6	81.0	81.4	80.9	80.9	82.6	83.3	82.8	82.7	81.2
OWNED BY UNITED STATES INDIVIDUALS	17.4	16.1	15.8	15.7	14.8	14.8	13.5	12.0	13.3	13.7	15.7
OWNED BY UNITED STATES GOVERNMENT	3.0	3.2	3.0	2.6	4.1	3.9	3.5	4.4	3.3	3.0	2.6
FOREIGN OWNED	.1	.1	.2	.3	.2	.4	.4	.3	.6	.6	.5
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	14.3	20.3	19.5	18.7	15.1	17.0	16.1	16.1	15.6	8.5	13.4
FOREIGN OWNED	85.7	79.7	80.5	81.3	84.9	83.0	83.9	83.9	84.4	91.5	86.6

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Office, Computing and Accounting Machines



OTHER MACHINERY, EXCEPT ELECTRICAL

NUMBER OF PATENTS

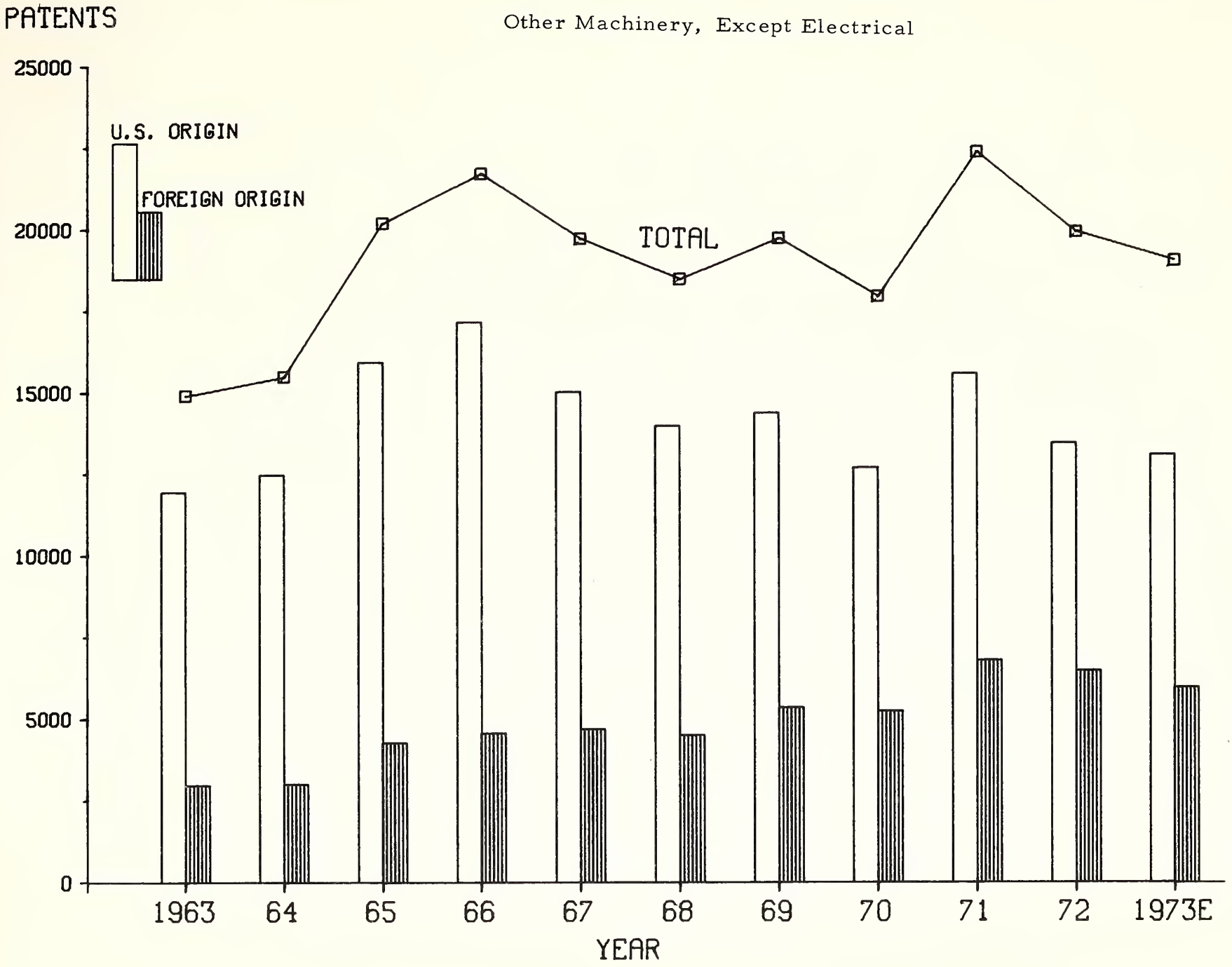
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	14897	15472	20163	21671	19676	18437	19683	17899	22327	19889	19014
ORIGINATING IN THE UNITED STATES	11936	12470	15906	17122	14995	13949	14344	12676	15546	13424	13068
ORIGINATING IN OTHER COUNTRIES	2961	3002	4257	4549	4681	4488	5339	5223	6781	6465	5946
PATENTS ORIGINATING IN THE UNITED STATES	11936	12470	15906	17122	14995	13949	14344	12676	15546	13424	13068
OWNED BY UNITED STATES CORPORATIONS	8492	8823	11311	12512	10807	10291	10591	9480	11421	9621	9414
OWNED BY UNITED STATES INDIVIDUALS	3257	3408	4285	4284	3862	3395	3454	2855	3703	3461	3338
OWNED BY UNITED STATES GOVERNMENT	165	199	275	261	278	209	236	258	282	250	236
FOREIGN OWNED	22	40	35	65	48	54	63	83	140	92	80
PATENTS ORIGINATING IN OTHER COUNTRIES	2961	3002	4257	4549	4681	4488	5339	5223	6781	6465	5946
UNITED STATES OWNED	252	273	354	463	416	434	418	484	530	443	372
FOREIGN OWNED	2709	2729	3903	4086	4265	4054	4921	4739	6251	6022	5574

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.1	80.6	78.9	79.0	76.2	75.7	72.9	70.8	69.6	67.5	68.7
ORIGINATING IN OTHER COUNTRIES	19.9	19.4	21.1	21.0	23.8	24.3	27.1	29.2	30.4	32.5	31.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	71.1	70.8	71.1	73.1	72.1	73.8	73.8	74.8	73.5	71.7	72.0
OWNED BY UNITED STATES INDIVIDUALS	27.3	27.3	27.0	25.0	25.7	24.3	24.1	22.5	23.8	25.8	25.6
OWNED BY UNITED STATES GOVERNMENT	1.4	1.6	1.7	1.5	1.9	1.5	1.7	2.0	1.8	1.8	1.8
FOREIGN OWNED	.2	.3	.2	.4	.3	.4	.4	.7	.9	.7	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.5	9.1	8.3	10.2	8.9	9.7	7.8	9.3	7.8	6.9	6.3
FOREIGN OWNED	91.5	90.9	91.7	89.8	91.1	90.3	92.2	90.7	92.2	93.1	93.7

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Other Machinery, Except Electrical



ELECTRICAL EQUIPMENT, EXCEPT COMMUNICATION EQUIPMENT

NUMBER OF PATENTS

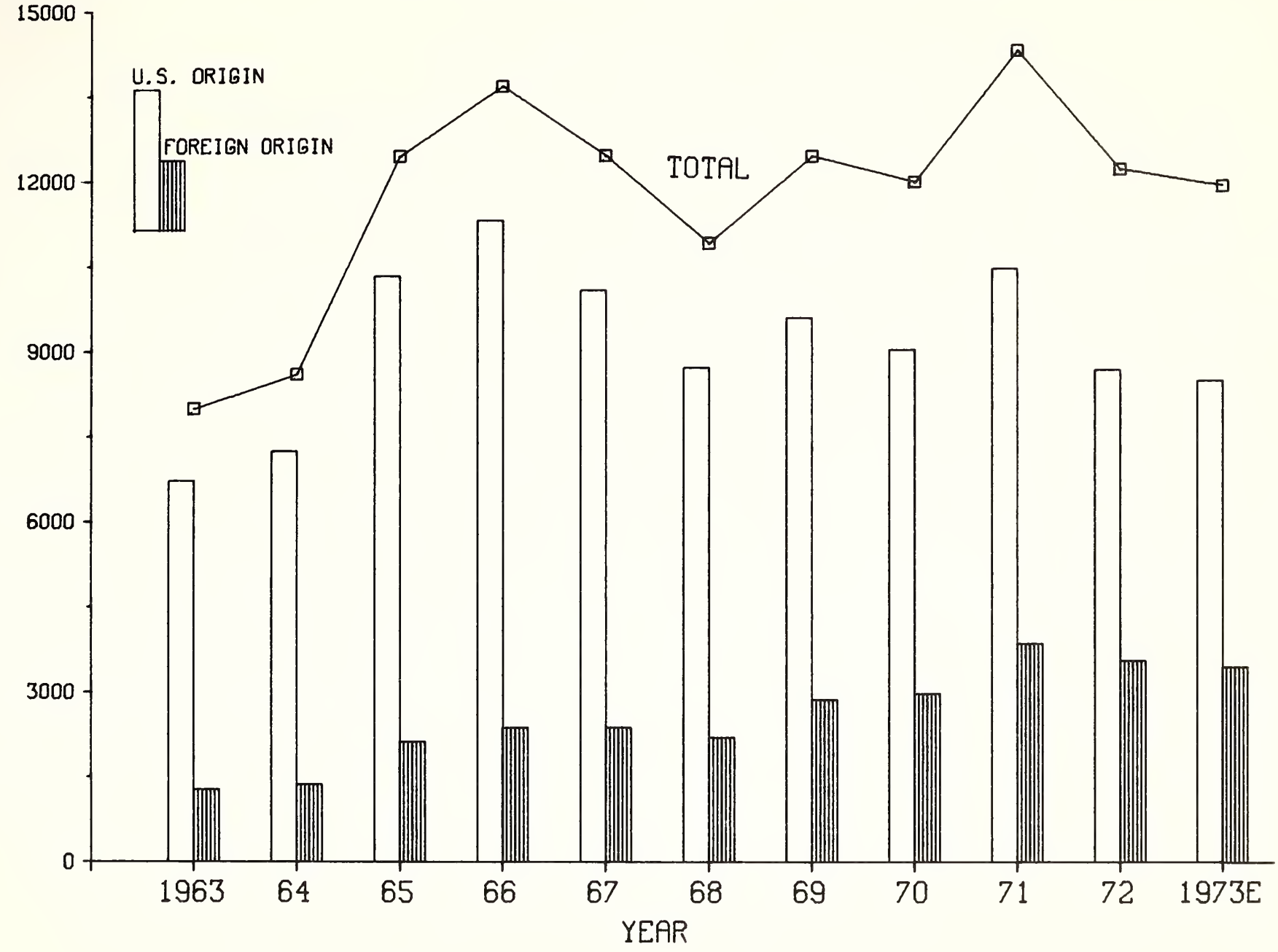
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	7995	8605	12450	13690	12468	10915	12454	12007	14336	12240	11952
ORIGINATING IN THE UNITED STATES	6720	7240	10334	11322	10093	8724	9601	9042	10481	8692	8512
ORIGINATING IN OTHER COUNTRIES	1275	1365	2116	2368	2375	2191	2853	2965	3855	3548	3440
PATENTS ORIGINATING IN THE UNITED STATES	6720	7240	10334	11322	10093	8724	9601	9042	10481	8692	8512
OWNED BY UNITED STATES CORPORATIONS	5155	5487	8006	8959	7874	6864	7556	7185	8288	6679	6566
OWNED BY UNITED STATES INDIVIDUALS	1350	1441	1916	1914	1741	1463	1578	1370	1659	1640	1542
OWNED BY UNITED STATES GOVERNMENT	207	302	394	410	459	362	442	430	439	320	350
FOREIGN OWNED	8	10	18	39	19	35	25	57	95	53	54
PATENTS ORIGINATING IN OTHER COUNTRIES	1275	1365	2116	2368	2375	2191	2853	2965	3855	3548	3440
UNITED STATES OWNED	180	190	326	397	357	326	379	406	510	346	366
FOREIGN OWNED	1095	1175	1790	1971	2018	1865	2474	2559	3345	3202	3074

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.1	84.1	83.0	82.7	81.0	79.9	77.1	75.3	73.1	71.0	71.2
ORIGINATING IN OTHER COUNTRIES	15.9	15.9	17.0	17.3	19.0	20.1	22.9	24.7	26.9	29.0	28.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	76.7	75.8	77.5	79.1	78.0	78.7	78.7	79.5	79.1	76.8	77.1
OWNED BY UNITED STATES INDIVIDUALS	20.1	19.9	18.5	16.9	17.3	16.7	16.4	15.1	15.8	18.9	18.2
OWNED BY UNITED STATES GOVERNMENT	3.1	4.2	3.8	3.7	4.5	4.2	4.6	4.8	4.2	3.7	4.1
FOREIGN OWNED	.1	.1	.2	.3	.2	.4	.3	.6	.9	.6	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	14.1	13.9	15.4	16.8	15.0	14.9	13.3	13.7	13.2	9.8	10.6
FOREIGN OWNED	85.9	86.1	84.6	83.2	85.0	85.1	86.7	86.3	86.8	90.2	89.4

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Electrical Equipment, Except Communication Equipment



ELECTRIC TRANSMISSION AND DISTRIBUTION EQUIPMENT

NUMBER OF PATENTS

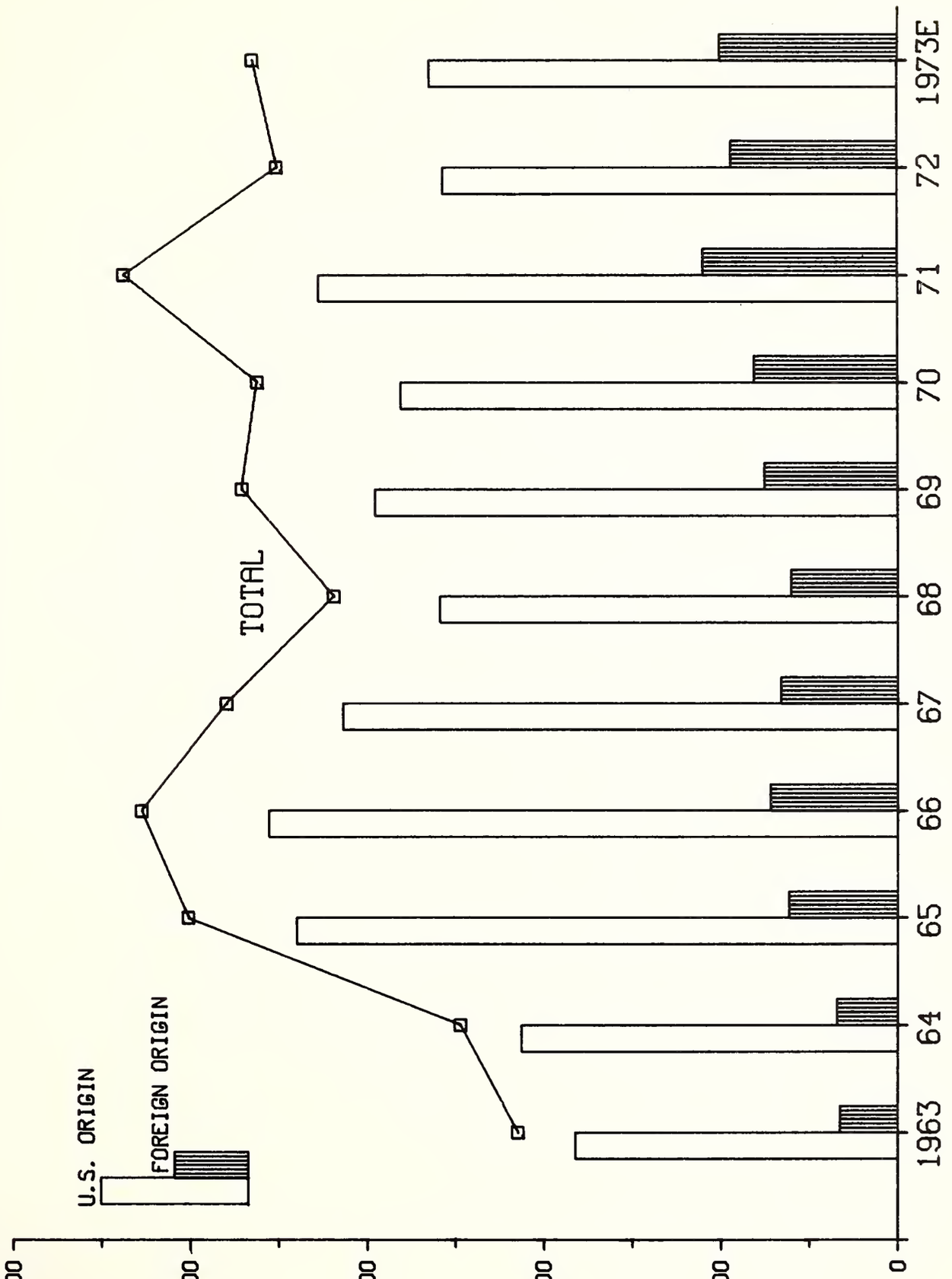
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2577	2964	4808	5122	4546	3820	4442	4339	5246	4213	4378
ORIGINATING IN THE UNITED STATES	2186	2552	4071	4259	3756	3099	3539	3367	3926	3084	3174
ORIGINATING IN OTHER COUNTRIES	391	412	737	863	790	721	903	972	1320	1129	1204
PATENTS ORIGINATING IN THE UNITED STATES	2186	2552	4071	4259	3756	3099	3539	3367	3926	3084	3174
OWNED BY UNITED STATES CORPORATIONS	1736	1998	3276	3432	2999	2472	2820	2767	3153	2403	2482
OWNED BY UNITED STATES INDIVIDUALS	357	426	596	604	527	432	490	379	512	493	500
OWNED BY UNITED STATES GOVERNMENT	92	128	194	210	224	183	219	206	231	170	174
FOREIGN OWNED	1	0	5	13	6	12	10	15	30	18	18
PATENTS ORIGINATING IN OTHER COUNTRIES	391	412	737	863	790	721	903	972	1320	1129	1204
UNITED STATES OWNED	56	67	131	149	124	122	131	154	180	114	134
FOREIGN OWNED	335	345	606	714	666	599	772	818	1140	1015	1070

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.8	86.1	84.7	83.2	82.6	81.1	79.7	77.6	74.8	73.2	72.5
ORIGINATING IN OTHER COUNTRIES	15.2	13.9	15.3	16.8	17.4	18.9	20.3	22.4	25.2	26.8	27.5
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	79.4	78.3	80.5	80.6	79.8	79.8	79.7	82.2	80.3	77.9	78.2
OWNED BY UNITED STATES INDIVIDUALS	16.3	16.7	14.6	14.2	14.1	13.9	13.8	11.2	13.1	16.0	15.8
OWNED BY UNITED STATES GOVERNMENT	4.3	5.0	4.8	4.9	5.9	5.9	6.2	6.2	5.8	5.5	5.4
FOREIGN OWNED	0.0	0.0	.1	.3	.2	.4	.3	.4	.8	.6	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	14.3	16.3	17.8	17.3	15.7	16.9	14.5	15.8	13.6	10.1	11.1
FOREIGN OWNED	85.7	83.7	82.2	82.7	84.3	83.1	85.5	84.2	86.4	89.9	88.9

ANNUAL U.S. PATENT ACTIVITY, TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Electric Transmission and Distribution Equipment



ELECTRICAL INDUSTRIAL APPARATUS

NUMBER OF PATENTS

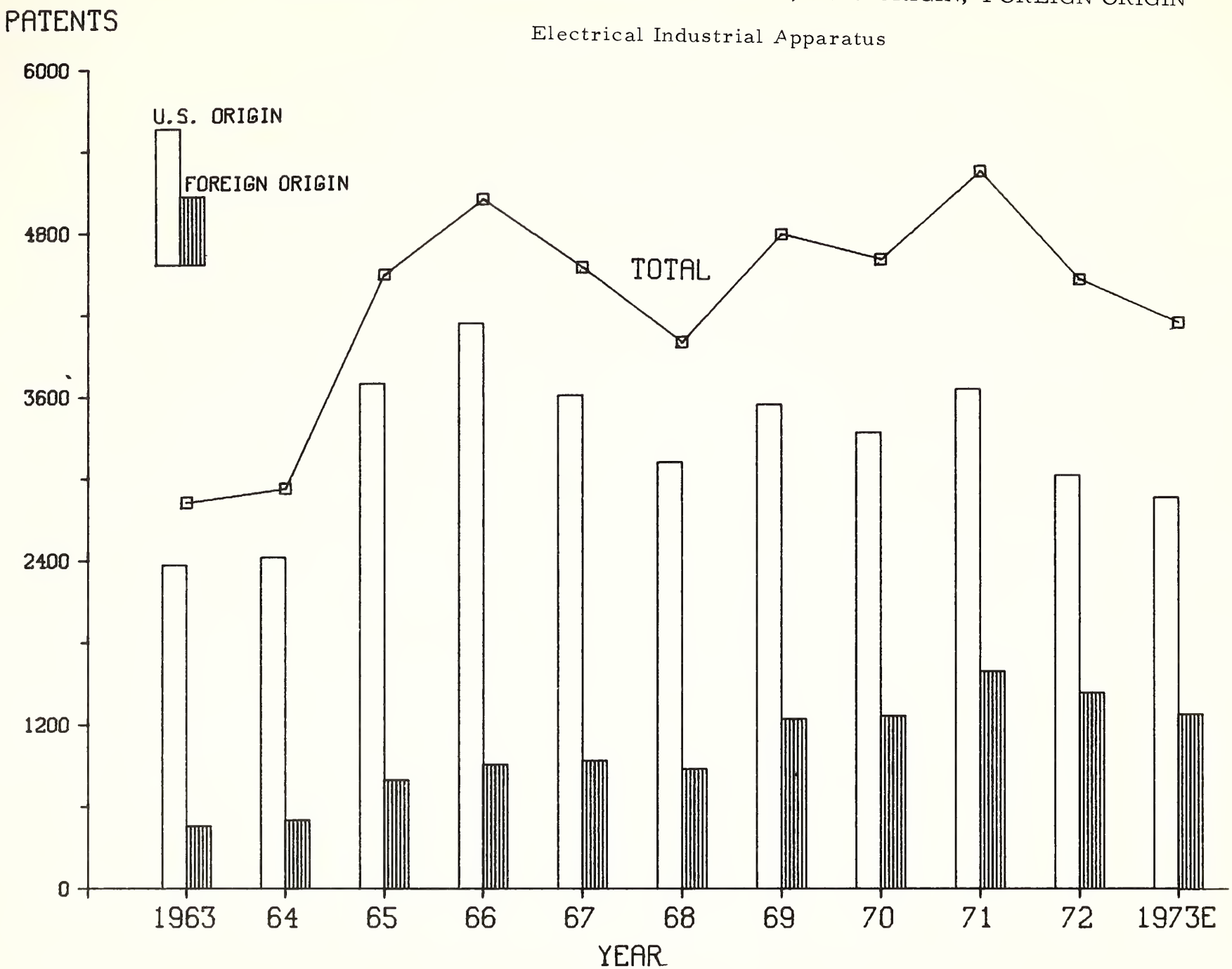
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2828	2929	4499	5051	4555	4005	4794	4613	5260	4468	4150
ORIGINATING IN THE UNITED STATES	2369	2428	3701	4141	3616	3128	3550	3345	3665	3031	2870
ORIGINATING IN OTHER COUNTRIES	459	501	798	910	939	877	1244	1268	1595	1437	1280
PATENTS ORIGINATING IN THE UNITED STATES	2369	2428	3701	4141	3616	3128	3550	3345	3665	3031	2870
OWNED BY UNITED STATES CORPORATIONS	1934	2010	3050	3489	3001	2631	2980	2822	3080	2491	2326
OWNED BY UNITED STATES INDIVIDUALS	356	315	501	515	433	363	390	354	417	421	412
OWNED BY UNITED STATES GOVERNMENT	75	99	145	125	178	122	172	150	130	104	102
FOREIGN OWNED	4	4	5	12	4	12	8	19	38	15	30
PATENTS ORIGINATING IN OTHER COUNTRIES	459	501	798	910	939	877	1244	1268	1595	1437	1280
UNITED STATES OWNED	73	78	125	178	151	139	152	156	177	114	110
FOREIGN OWNED	386	423	673	732	788	738	1092	1112	1418	1323	1170

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	83.8	82.9	82.3	82.0	79.4	78.1	74.1	72.5	69.7	67.8	69.2
ORIGINATING IN OTHER COUNTRIES	16.2	17.1	17.7	18.0	20.6	21.9	25.9	27.5	30.3	32.2	30.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	81.6	82.8	82.4	84.3	83.0	84.1	83.9	84.4	84.0	82.2	81.0
OWNED BY UNITED STATES INDIVIDUALS	15.1	13.0	13.5	12.4	12.0	11.6	11.0	10.5	11.4	13.9	14.4
OWNED BY UNITED STATES GOVERNMENT	3.1	4.0	4.0	3.0	4.9	3.9	4.9	4.5	3.6	3.4	3.6
FOREIGN OWNED	.2	.2	.1	.3	.1	.4	.2	.6	1.0	.5	1.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	15.9	15.6	15.7	19.6	16.1	15.8	12.2	12.3	11.1	7.9	8.6
FOREIGN OWNED	84.1	84.4	84.3	80.4	83.9	84.2	87.8	87.7	88.9	92.1	91.4

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Electrical Industrial Apparatus



OTHER ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

NUMBER OF PATENTS

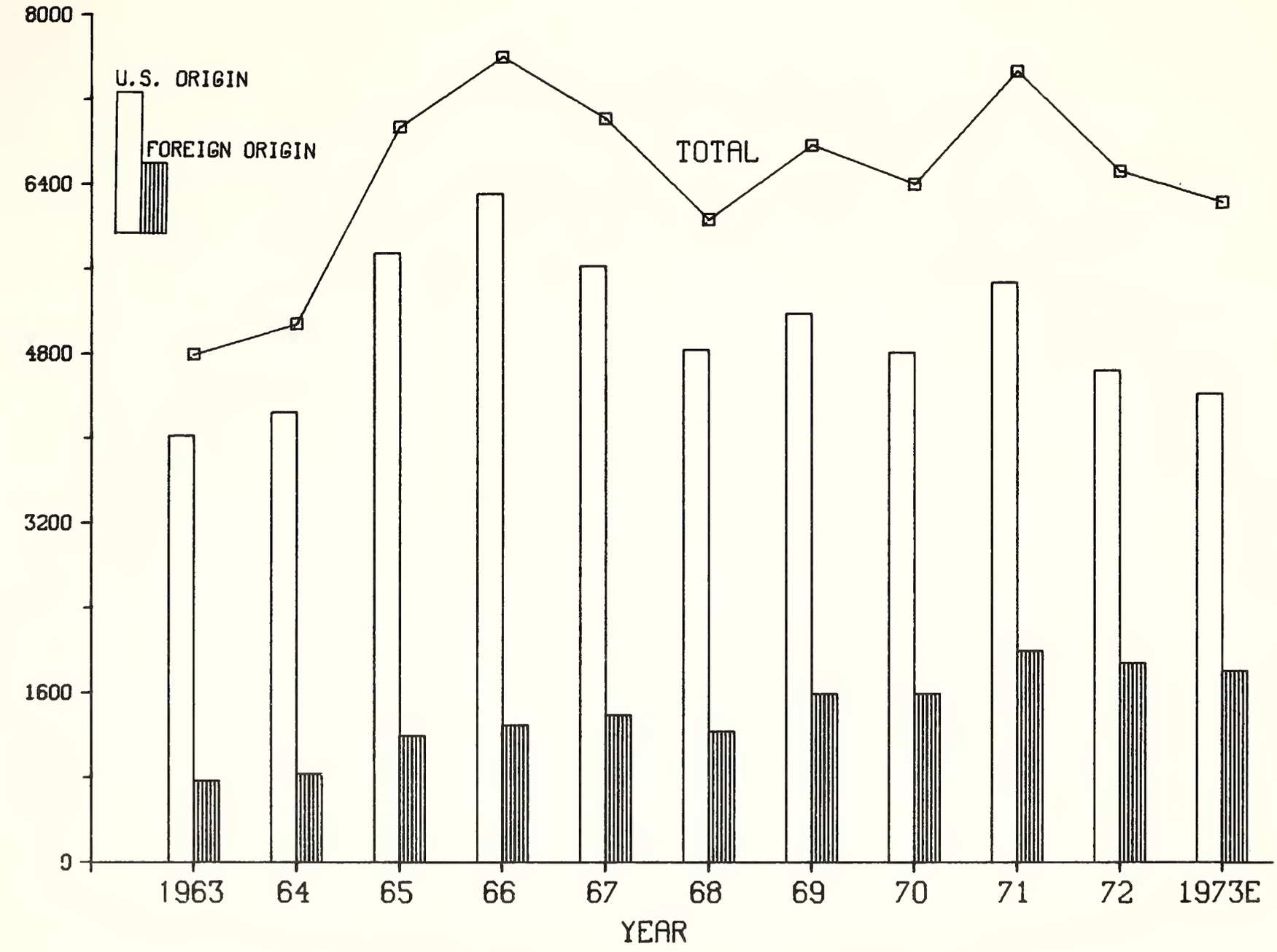
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	4788	5073	6931	7586	7005	6056	6753	6391	7455	6515	6224
ORIGINATING IN THE UNITED STATES	4023	4239	5739	6295	5618	4825	5166	4801	5461	4638	4420
ORIGINATING IN OTHER COUNTRIES	765	834	1192	1291	1387	1231	1587	1590	1994	1877	1804
PATENTS ORIGINATING IN THE UNITED STATES	4023	4239	5739	6295	5618	4825	5166	4801	5461	4638	4420
OWNED BY UNITED STATES CORPORATIONS	2984	3093	4281	4869	4248	3683	3930	3647	4165	3414	3302
OWNED BY UNITED STATES INDIVIDUALS	931	982	1269	1219	1153	968	1021	912	1068	1059	946
OWNED BY UNITED STATES GOVERNMENT	103	157	178	181	204	157	203	206	175	134	146
FOREIGN OWNED	5	7	11	26	13	17	12	36	53	31	26
PATENTS ORIGINATING IN OTHER COUNTRIES	765	834	1192	1291	1387	1231	1587	1590	1994	1877	1804
UNITED STATES OWNED	97	104	177	202	202	167	197	210	255	195	194
FOREIGN OWNED	668	730	1015	1089	1185	1064	1390	1380	1739	1682	1610

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.0	83.6	82.8	83.0	80.2	79.7	76.5	75.1	73.3	71.2	71.0
ORIGINATING IN OTHER COUNTRIES	16.0	16.4	17.2	17.0	19.8	20.3	23.5	24.9	26.7	28.8	29.0
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	74.2	73.0	74.6	77.3	75.6	76.3	76.1	76.0	76.3	73.6	74.7
OWNED BY UNITED STATES INDIVIDUALS	23.1	23.1	22.1	19.4	20.5	20.1	19.7	19.0	19.5	22.8	21.4
OWNED BY UNITED STATES GOVERNMENT	2.6	3.7	3.1	2.9	3.7	3.2	4.0	4.3	3.2	2.9	3.3
FOREIGN OWNED	.1	.2	.2	.4	.2	.4	.2	.7	1.0	.7	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	12.7	12.5	14.8	15.6	14.6	13.6	12.4	13.2	12.8	10.4	10.8
FOREIGN OWNED	87.3	87.5	85.2	84.4	85.4	86.4	87.6	86.8	87.2	89.6	89.2

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Other Electrical Machinery, Equipment and Supplies



COMMUNICATION EQUIPMENT AND ELECTRONIC COMPONENTS

NUMBER OF PATENTS

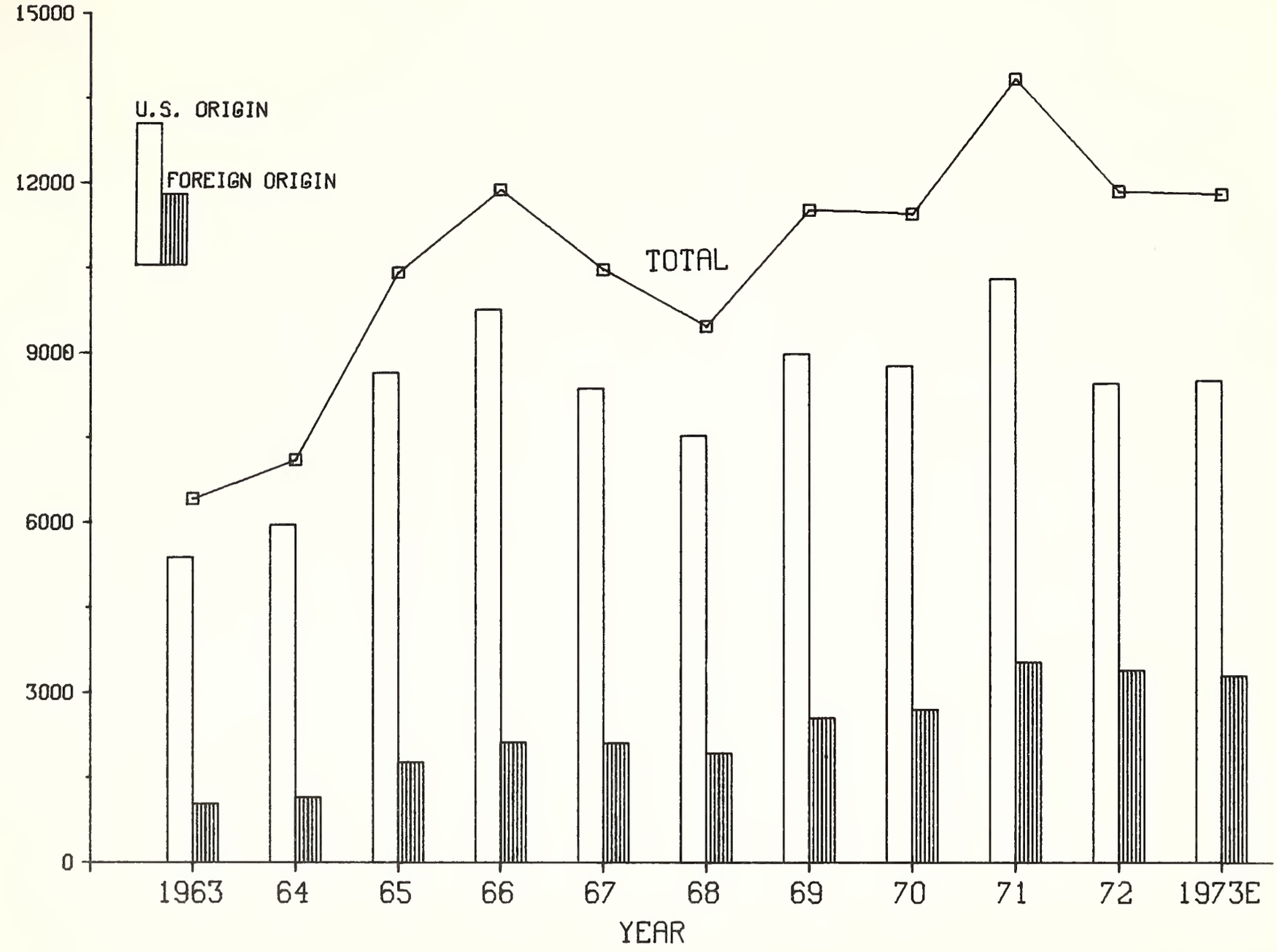
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	6412	7101	10403	11863	10457	9453	11513	11445	13828	11842	11796
ORIGINATING IN THE UNITED STATES	5383	5953	8636	9752	8360	7530	8964	8755	10301	8458	8502
ORIGINATING IN OTHER COUNTRIES	1029	1148	1767	2111	2097	1923	2549	2690	3527	3384	3294
PATENTS ORIGINATING IN THE UNITED STATES	5383	5953	8636	9752	8360	7530	8964	8755	10301	8458	8502
OWNED BY UNITED STATES CORPORATIONS	4231	4720	6932	7884	6613	5990	7307	7105	8278	6690	6622
OWNED BY UNITED STATES INDIVIDUALS	829	836	1142	1323	1106	1000	1019	979	1247	1231	1258
OWNED BY UNITED STATES GOVERNMENT	319	388	548	528	620	517	609	630	678	492	586
FOREIGN OWNED	5	9	14	17	21	23	29	41	98	45	36
PATENTS ORIGINATING IN OTHER COUNTRIES	1029	1148	1767	2111	2097	1923	2549	2690	3527	3384	3294
UNITED STATES OWNED	222	269	427	491	423	374	499	575	661	487	496
FOREIGN OWNED	807	879	1340	1620	1674	1549	2050	2115	2866	2897	2798

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.0	83.8	83.0	82.2	79.9	79.7	77.9	76.5	74.5	71.4	72.1
ORIGINATING IN OTHER COUNTRIES	16.0	16.2	17.0	17.8	20.1	20.3	22.1	23.5	25.5	28.6	27.9
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	78.6	79.3	80.3	80.8	79.1	79.5	81.5	81.2	80.4	79.1	77.9
OWNED BY UNITED STATES INDIVIDUALS	15.4	14.0	13.2	13.6	13.2	13.3	11.4	11.1	12.1	14.6	14.8
OWNED BY UNITED STATES GOVERNMENT	5.9	6.5	6.3	5.4	7.4	6.9	6.8	7.2	6.5	5.8	6.9
FOREIGN OWNED	.1	.2	.2	.2	.3	.3	.3	.5	1.0	.5	.4
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	21.6	23.4	24.2	23.3	20.2	19.4	19.6	21.4	18.7	14.4	15.1
FOREIGN OWNED	78.4	76.6	75.8	76.7	79.8	80.6	80.4	78.6	81.3	85.6	84.9

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Communication Equipment and Electronic Components



RADIO AND TELEVISION RECEIVING EQUIPMENT, EXCEPT COMMUNICATION TYPES

NUMBER OF PATENTS

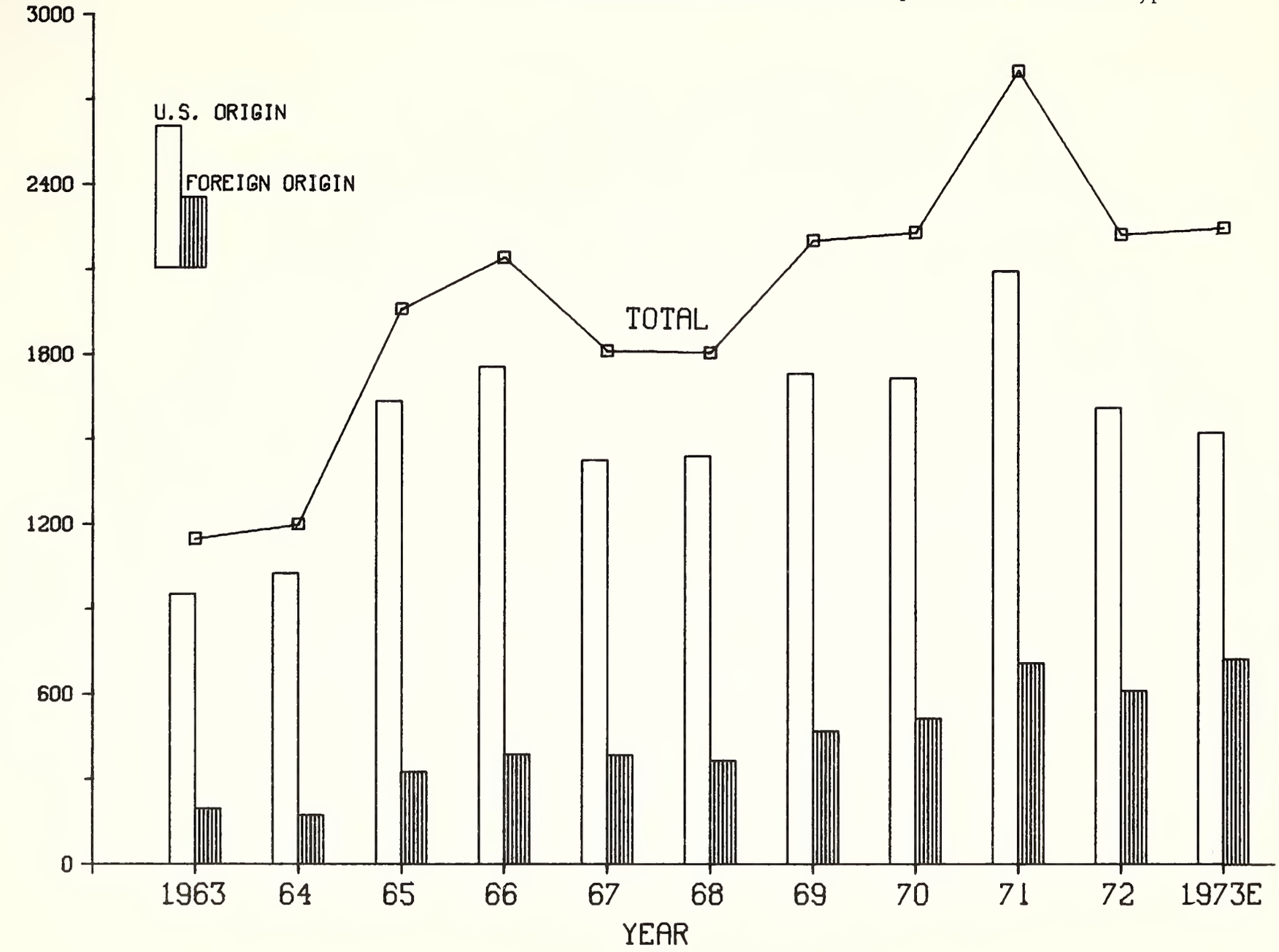
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1149	1200	1958	2140	1810	1803	2199	2227	2799	2222	2246
ORIGINATING IN THE UNITED STATES	953	1026	1632	1753	1425	1438	1730	1714	2091	1610	1524
ORIGINATING IN OTHER COUNTRIES	196	174	326	387	385	365	469	513	708	612	722
PATENTS ORIGINATING IN THE UNITED STATES	953	1026	1632	1753	1425	1438	1730	1714	2091	1610	1524
OWNED BY UNITED STATES CORPORATIONS	775	836	1351	1434	1123	1149	1431	1440	1713	1336	1250
OWNED BY UNITED STATES INDIVIDUALS	124	112	175	219	184	182	150	134	188	147	166
OWNED BY UNITED STATES GOVERNMENT	54	77	104	97	116	102	145	132	171	120	100
FOREIGN OWNED	0	1	2	3	2	5	4	8	19	7	8
PATENTS ORIGINATING IN OTHER COUNTRIES	196	174	326	387	385	365	469	513	708	612	722
UNITED STATES OWNED	54	46	68	100	77	77	106	126	125	94	98
FOREIGN OWNED	142	128	258	287	308	288	363	387	583	518	624

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	82.9	85.5	83.4	81.9	78.7	79.8	78.7	77.0	74.7	72.5	67.9
ORIGINATING IN OTHER COUNTRIES	17.1	14.5	16.6	18.1	21.3	20.2	21.3	23.0	25.3	27.5	32.1
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	81.3	81.5	82.8	81.8	78.8	79.9	82.7	84.0	81.9	83.0	82.0
OWNED BY UNITED STATES INDIVIDUALS	13.0	10.9	10.7	12.5	12.9	12.7	8.7	7.8	9.0	9.1	10.9
OWNED BY UNITED STATES GOVERNMENT	5.7	7.5	6.4	5.5	8.2	7.1	8.4	7.7	8.2	7.5	6.6
FOREIGN OWNED	0.0	.1	.1	.2	.1	.3	.2	.5	.9	.4	.5
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	27.6	26.4	20.9	25.8	20.0	21.1	22.6	24.6	17.7	15.4	13.6
FOREIGN OWNED	72.4	73.6	79.1	74.2	80.0	78.9	77.4	75.4	82.3	84.6	86.4

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Radio and Television Receiving Equipment, Except Communication Types



ELECTRONIC COMPONENTS AND ACCESSORIES AND COMMUNICATION EQUIPMENT

NUMBER OF PATENTS

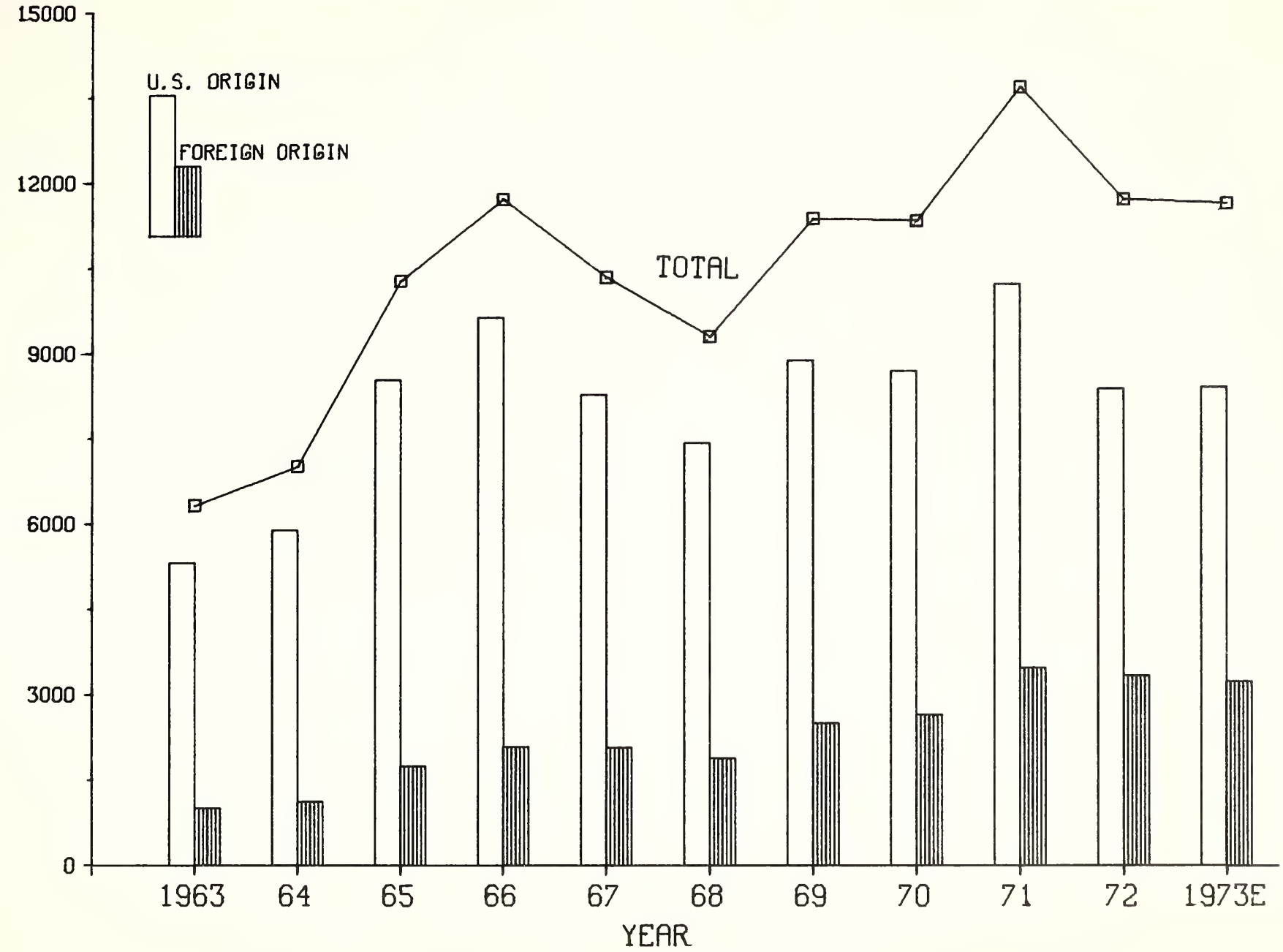
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	6323	7009	10267	11704	10333	9295	11364	11333	13686	11709	11644
ORIGINATING IN THE UNITED STATES	5315	5888	8527	9623	8264	7414	8874	8687	10215	8379	8412
ORIGINATING IN OTHER COUNTRIES	1008	1121	1740	2081	2069	1881	2490	2646	3471	3330	3232
PATENTS ORIGINATING IN THE UNITED STATES	5315	5888	8527	9623	8264	7414	8874	8687	10215	8379	8412
OWNED BY UNITED STATES CORPORATIONS	4179	4671	6847	7790	6543	5904	7235	7044	8212	6622	6546
OWNED BY UNITED STATES INDIVIDUALS	813	822	1118	1289	1080	970	1002	972	1229	1221	1244
OWNED BY UNITED STATES GOVERNMENT	318	386	548	527	620	517	609	630	678	491	586
FOREIGN OWNED	5	9	14	17	21	23	28	41	96	45	36
PATENTS ORIGINATING IN OTHER COUNTRIES	1008	1121	1740	2081	2069	1881	2490	2646	3471	3330	3232
UNITED STATES OWNED	220	264	423	489	422	369	494	572	654	483	492
FOREIGN OWNED	788	857	1317	1592	1647	1512	1996	2074	2817	2847	2740

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	84.1	84.0	83.1	82.2	80.0	79.8	78.1	76.7	74.6	71.6	72.2
ORIGINATING IN OTHER COUNTRIES	15.9	16.0	16.9	17.8	20.0	20.2	21.9	23.3	25.4	28.4	27.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	78.6	79.3	80.3	81.0	79.2	79.6	81.5	81.1	80.4	79.0	77.8
OWNED BY UNITED STATES INDIVIDUALS	15.3	14.0	13.1	13.3	13.0	13.1	11.3	11.2	12.0	14.6	14.8
OWNED BY UNITED STATES GOVERNMENT	6.0	6.5	6.4	5.5	7.5	7.0	6.9	7.2	6.7	5.9	7.0
FOREIGN OWNED	.1	.2	.2	.2	.3	.3	.3	.5	.9	.5	.4
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	21.8	23.6	24.3	23.5	20.4	19.6	19.8	21.6	18.8	14.5	15.2
FOREIGN OWNED	78.2	76.4	75.7	76.5	79.6	80.4	80.2	78.4	81.2	85.5	84.8

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Electronic Components and Accessories and Communication Equipment



MOTOR VEHICLES AND OTHER TRANSPORTATION EQUIPMENT, EXCEPT AIRCRAFT

NUMBER OF PATENTS

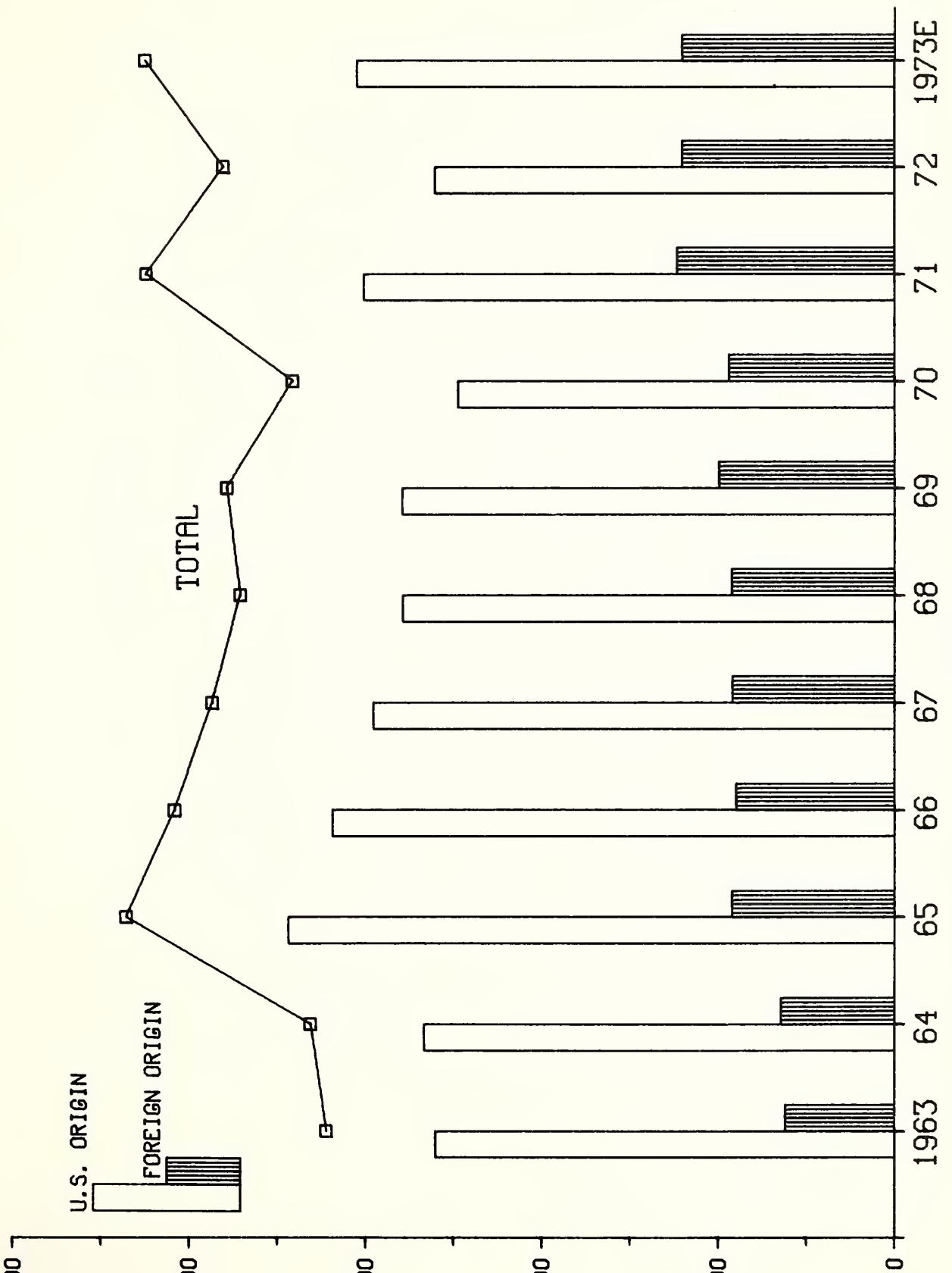
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	4507	4631	6090	5705	5407	5181	5290	4768	5928	5323	5942
ORIGINATING IN THE UNITED STATES	3641	3729	4804	4452	4125	3895	3899	3457	4206	3641	4262
ORIGINATING IN OTHER COUNTRIES	866	902	1286	1253	1282	1286	1391	1311	1722	1682	1680
PATENTS ORIGINATING IN THE UNITED STATES	3641	3729	4804	4452	4125	3895	3899	3457	4206	3641	4262
OWNED BY UNITED STATES CORPORATIONS	2216	2277	2920	2753	2492	2485	2406	2201	2656	2160	2418
OWNED BY UNITED STATES INDIVIDUALS	1177	1199	1568	1403	1352	1193	1271	1052	1283	1214	1354
OWNED BY UNITED STATES GOVERNMENT	238	243	310	278	271	210	216	190	248	248	454
FOREIGN OWNED	10	10	6	18	10	7	6	14	19	19	36
PATENTS ORIGINATING IN OTHER COUNTRIES	866	902	1286	1253	1282	1286	1391	1311	1722	1682	1680
UNITED STATES OWNED	56	57	65	78	69	84	92	80	110	100	104
FOREIGN OWNED	810	845	1221	1175	1213	1202	1299	1231	1612	1582	1576

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.8	80.5	78.9	78.0	76.3	75.2	73.7	72.5	71.0	68.4	71.7
ORIGINATING IN OTHER COUNTRIES	19.2	19.5	21.1	22.0	23.7	24.8	26.3	27.5	29.0	31.6	28.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	60.9	61.1	60.8	61.8	60.4	63.8	61.7	63.7	63.1	59.3	56.7
OWNED BY UNITED STATES INDIVIDUALS	32.3	32.1	32.6	31.6	32.8	30.6	32.6	30.4	30.6	33.4	31.8
OWNED BY UNITED STATES GOVERNMENT	6.5	6.5	6.5	6.2	6.6	5.4	5.5	5.5	5.8	6.8	10.7
FOREIGN OWNED	.3	.3	.1	.4	.2	.2	.2	.4	.5	.5	.8
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	6.5	6.3	5.1	6.2	5.4	6.5	6.6	6.1	6.4	5.9	6.2
FOREIGN OWNED	93.5	93.7	94.9	93.8	94.6	93.5	93.4	93.9	93.6	94.1	93.8

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Motor Vehicles and Other Transportation Equipment, Except Aircraft



MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT

NUMBER OF PATENTS

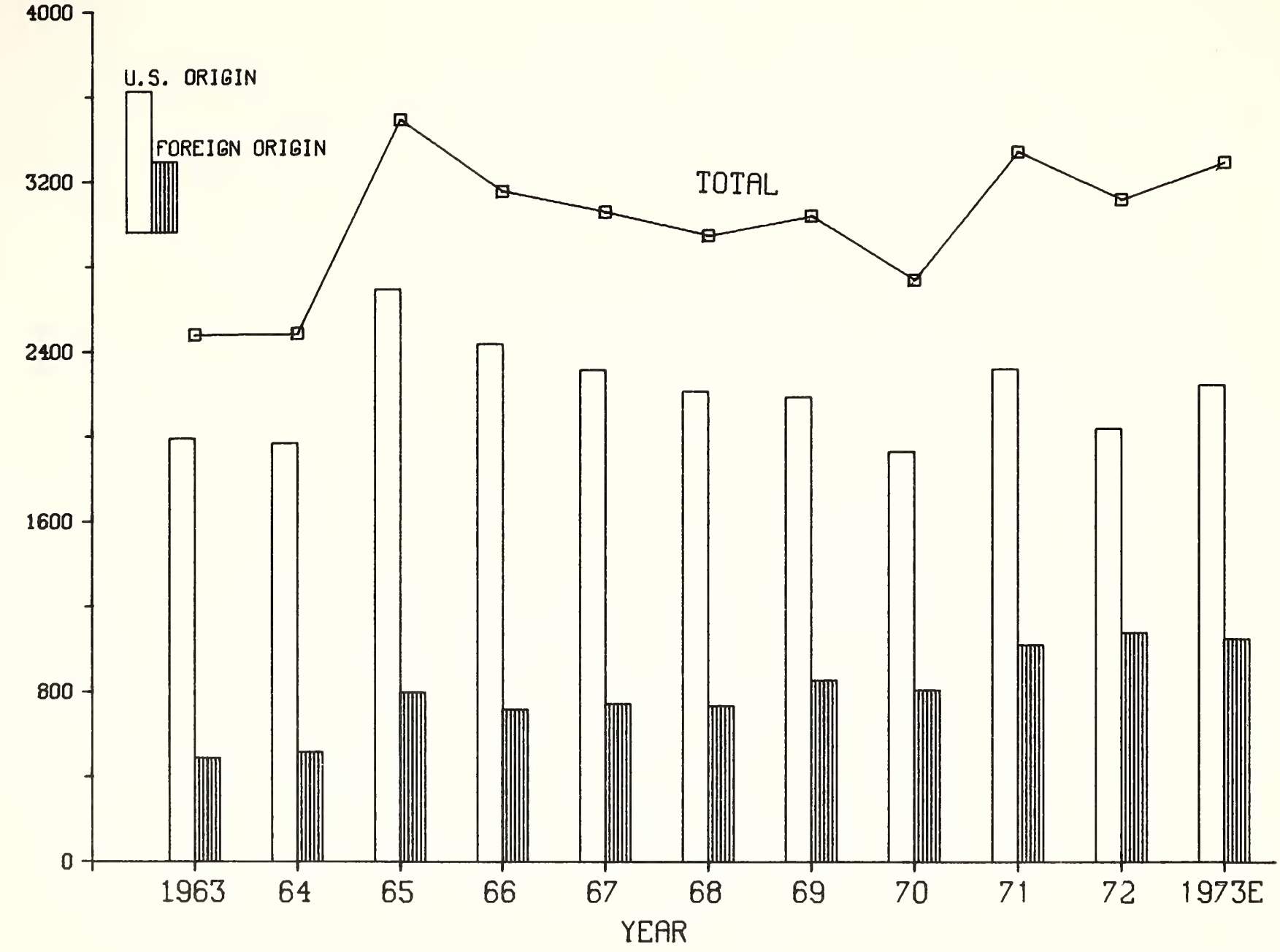
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	2480	2487	3493	3154	3058	2947	3040	2738	3342	3119	3294
ORIGINATING IN THE UNITED STATES	1991	1970	2695	2438	2315	2214	2186	1930	2320	2040	2246
ORIGINATING IN OTHER COUNTRIES	489	517	798	716	743	733	854	808	1022	1079	1048
PATENTS ORIGINATING IN THE UNITED STATES	1991	1970	2695	2438	2315	2214	2186	1930	2320	2040	2246
OWNED BY UNITED STATES CORPORATIONS	1334	1298	1738	1591	1483	1500	1412	1284	1539	1278	1426
OWNED BY UNITED STATES INDIVIDUALS	637	649	909	809	796	693	741	609	732	728	782
OWNED BY UNITED STATES GOVERNMENT	20	20	44	31	30	19	29	28	40	24	18
FOREIGN OWNED	0	3	4	7	6	2	4	9	9	10	20
PATENTS ORIGINATING IN OTHER COUNTRIES	489	517	798	716	743	733	854	808	1022	1079	1048
UNITED STATES OWNED	29	28	40	54	51	49	67	48	75	68	68
FOREIGN OWNED	460	489	758	662	692	684	787	760	947	1011	980

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.3	79.2	77.2	77.3	75.7	75.1	71.9	70.5	69.4	65.4	68.2
ORIGINATING IN OTHER COUNTRIES	19.7	20.8	22.8	22.7	24.3	24.9	28.1	29.5	30.6	34.6	31.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	67.0	65.9	64.5	65.3	64.1	67.8	64.6	66.5	66.3	62.6	63.5
OWNED BY UNITED STATES INDIVIDUALS	32.0	32.9	33.7	33.1	34.3	31.3	33.9	31.6	31.6	35.7	34.8
OWNED BY UNITED STATES GOVERNMENT	1.0	1.0	1.7	1.3	1.3	.8	1.3	1.4	1.7	1.2	.8
FOREIGN OWNED	0.0	.2	.1	.3	.3	.1	.2	.5	.4	.5	.9
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	5.9	5.4	5.0	7.5	6.9	6.7	7.8	5.9	7.3	6.3	6.5
FOREIGN OWNED	94.1	94.6	95.0	92.5	93.1	93.3	92.2	94.1	92.7	93.7	93.5

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Motor Vehicles and Motor Vehicle Equipment



GUIDED MISSILES AND SPACE VEHICLES AND PARTS

NUMBER OF PATENTS

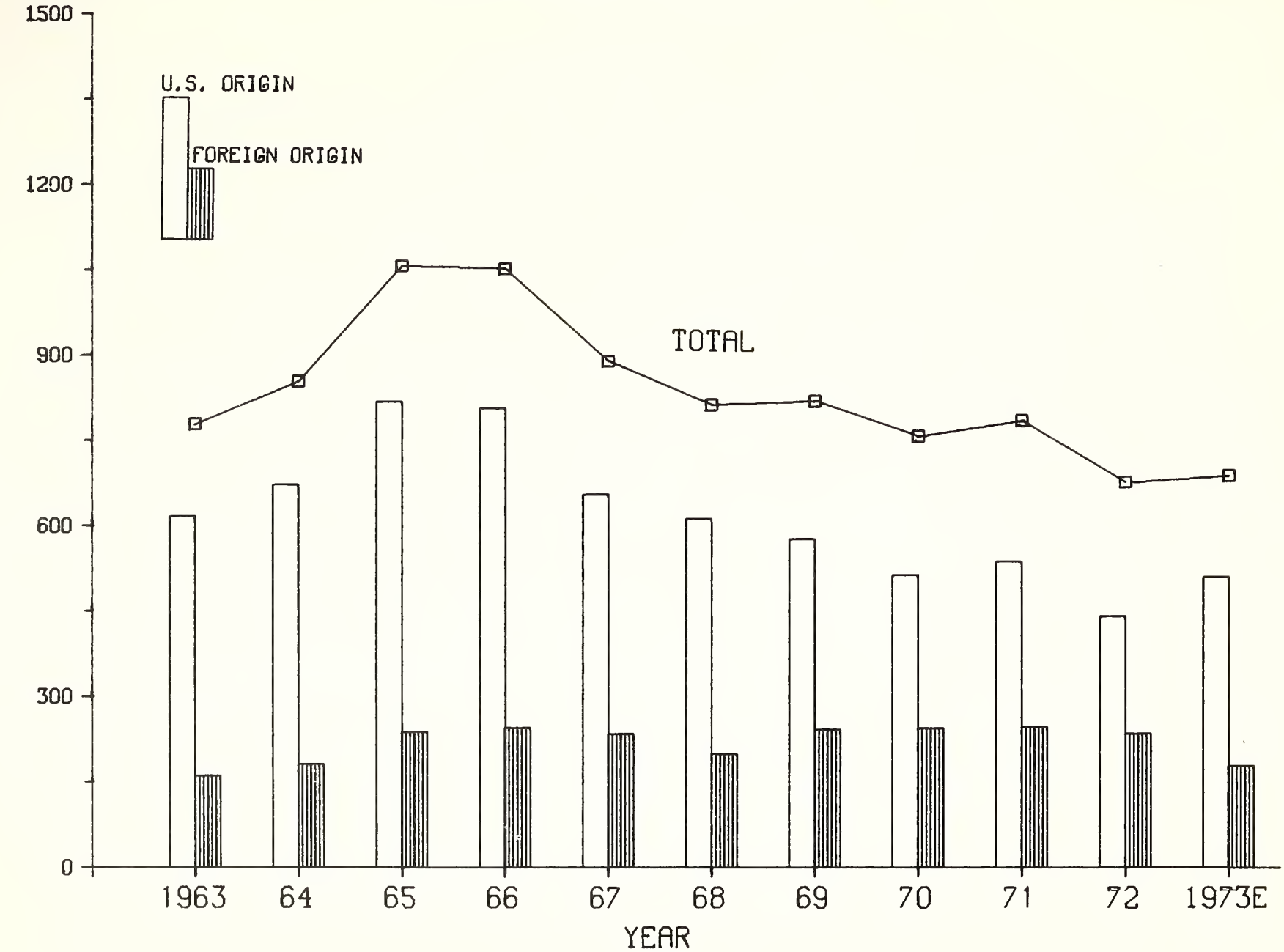
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	778	853	1055	1050	888	811	818	757	784	676	688
ORIGINATING IN THE UNITED STATES	617	672	817	805	654	612	576	513	537	441	510
ORIGINATING IN OTHER COUNTRIES	161	181	238	245	234	199	242	244	247	235	178
PATENTS ORIGINATING IN THE UNITED STATES	617	672	817	805	654	612	576	513	537	441	510
OWNED BY UNITED STATES CORPORATIONS	453	495	554	551	432	432	420	372	385	303	312
OWNED BY UNITED STATES INDIVIDUALS	110	125	161	143	121	113	95	79	78	71	76
OWNED BY UNITED STATES GOVERNMENT	53	50	101	105	98	65	60	59	70	63	122
FOREIGN OWNED	1	2	1	6	3	2	1	3	4	4	0
PATENTS ORIGINATING IN OTHER COUNTRIES	161	181	238	245	234	199	242	244	247	235	178
UNITED STATES OWNED	7	11	11	10	6	11	6	16	13	9	12
FOREIGN OWNED	154	170	227	235	228	188	236	228	234	226	166

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	79.3	78.8	77.4	76.7	73.6	75.5	70.4	67.8	68.5	65.2	74.1
ORIGINATING IN OTHER COUNTRIES	20.7	21.2	22.6	23.3	26.4	24.5	29.6	32.2	31.5	34.8	25.9
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	73.4	73.7	67.8	68.4	66.1	70.6	72.9	72.5	71.7	68.7	61.2
OWNED BY UNITED STATES INDIVIDUALS	17.8	18.6	19.7	17.8	18.5	18.5	16.5	15.4	14.5	16.1	14.9
OWNED BY UNITED STATES GOVERNMENT	8.6	7.4	12.4	13.1	14.9	10.6	10.4	11.5	13.1	14.3	23.9
FOREIGN OWNED	.2	.3	.1	.7	.5	.3	.2	.6	.7	.9	0.0
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	4.3	6.1	4.6	4.1	2.6	5.5	2.5	6.6	5.3	3.8	6.7
FOREIGN OWNED	95.7	93.9	95.4	95.9	97.4	94.5	97.5	93.4	94.7	96.2	93.3

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Guided Missiles and Space Vehicles and Parts



OTHER TRANSPORTATION EQUIPMENT

NUMBER OF PATENTS

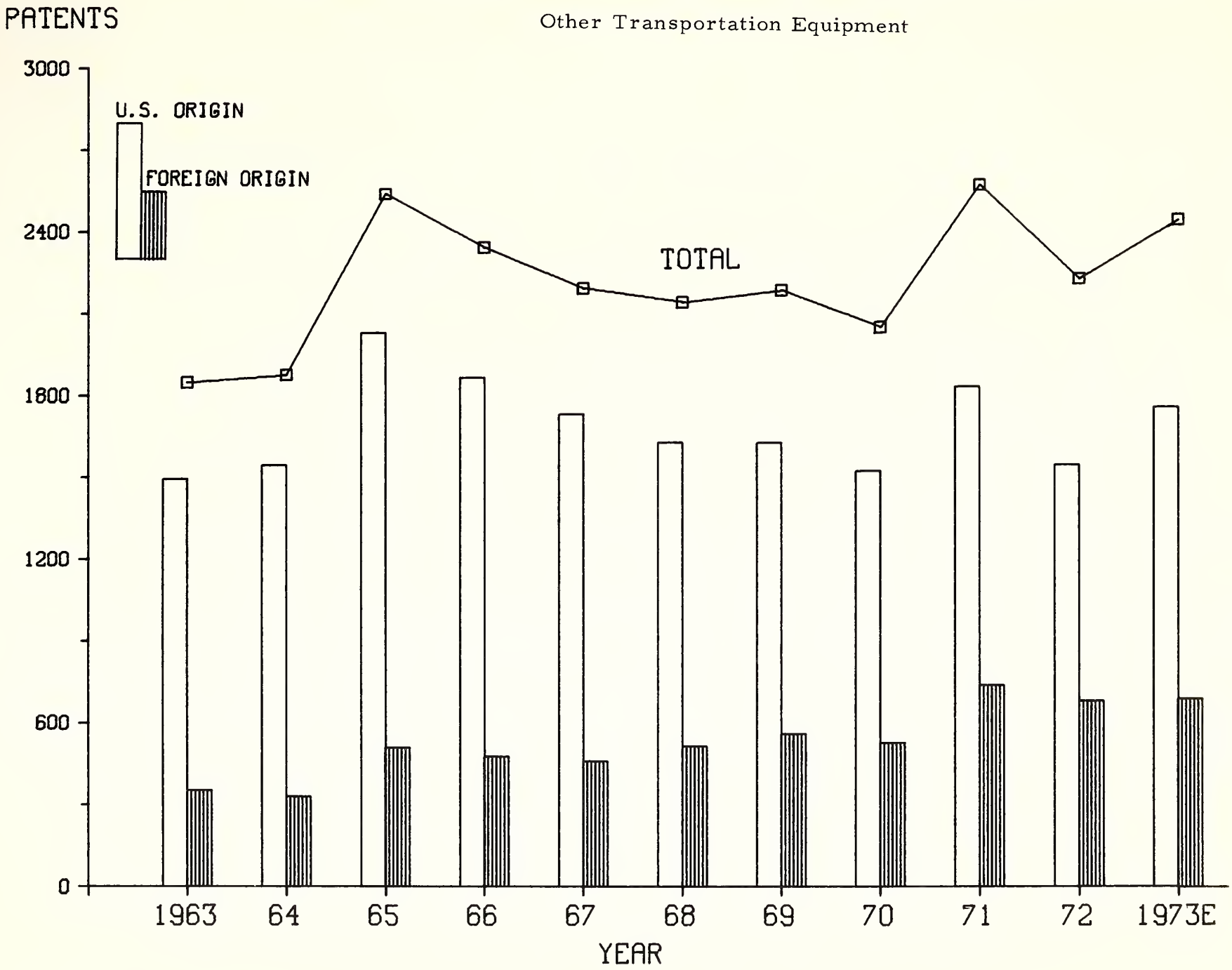
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1847	1873	2536	2340	2190	2140	2184	2049	2572	2228	2446
ORIGINATING IN THE UNITED STATES	1494	1543	2027	1864	1730	1626	1625	1523	1833	1547	1758
ORIGINATING IN OTHER COUNTRIES	353	330	509	476	460	514	559	526	739	681	688
PATENTS ORIGINATING IN THE UNITED STATES	1494	1543	2027	1864	1730	1626	1625	1523	1833	1547	1758
OWNED BY UNITED STATES CORPORATIONS	892	961	1294	1201	1101	1047	977	997	1182	933	1082
OWNED BY UNITED STATES INDIVIDUALS	559	550	693	627	586	537	608	497	605	576	612
OWNED BY UNITED STATES GOVERNMENT	34	28	39	33	39	38	39	27	38	32	44
FOREIGN OWNED	9	4	1	3	4	4	1	2	8	6	20
PATENTS ORIGINATING IN OTHER COUNTRIES	353	330	509	476	460	514	559	526	739	681	688
UNITED STATES OWNED	32	21	23	29	31	38	40	31	51	51	56
FOREIGN OWNED	321	309	486	447	429	476	519	495	688	630	632

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	80.9	82.4	79.9	79.7	79.0	76.0	74.4	74.3	71.3	69.4	71.9
ORIGINATING IN OTHER COUNTRIES	19.1	17.6	20.1	20.3	21.0	24.0	25.6	25.7	28.7	30.6	28.1
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	59.7	62.3	63.8	64.4	63.6	64.4	60.1	65.5	64.5	60.3	61.5
OWNED BY UNITED STATES INDIVIDUALS	37.4	35.6	34.2	33.7	33.9	33.0	37.4	32.6	33.0	37.2	34.9
OWNED BY UNITED STATES GOVERNMENT	2.3	1.8	2.0	1.7	2.3	2.4	2.4	1.8	2.1	2.1	2.5
FOREIGN OWNED	.6	.3	0.0	.2	.2	.2	.1	.1	.4	.4	1.1
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	9.1	6.4	4.5	6.1	6.7	7.4	7.2	5.9	6.9	7.5	8.1
FOREIGN OWNED	90.9	93.6	95.5	93.9	93.3	92.6	92.8	94.1	93.1	92.5	91.9

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Other Transportation Equipment



ORDNANCE, EXCEPT MISSILES

NUMBER OF PATENTS

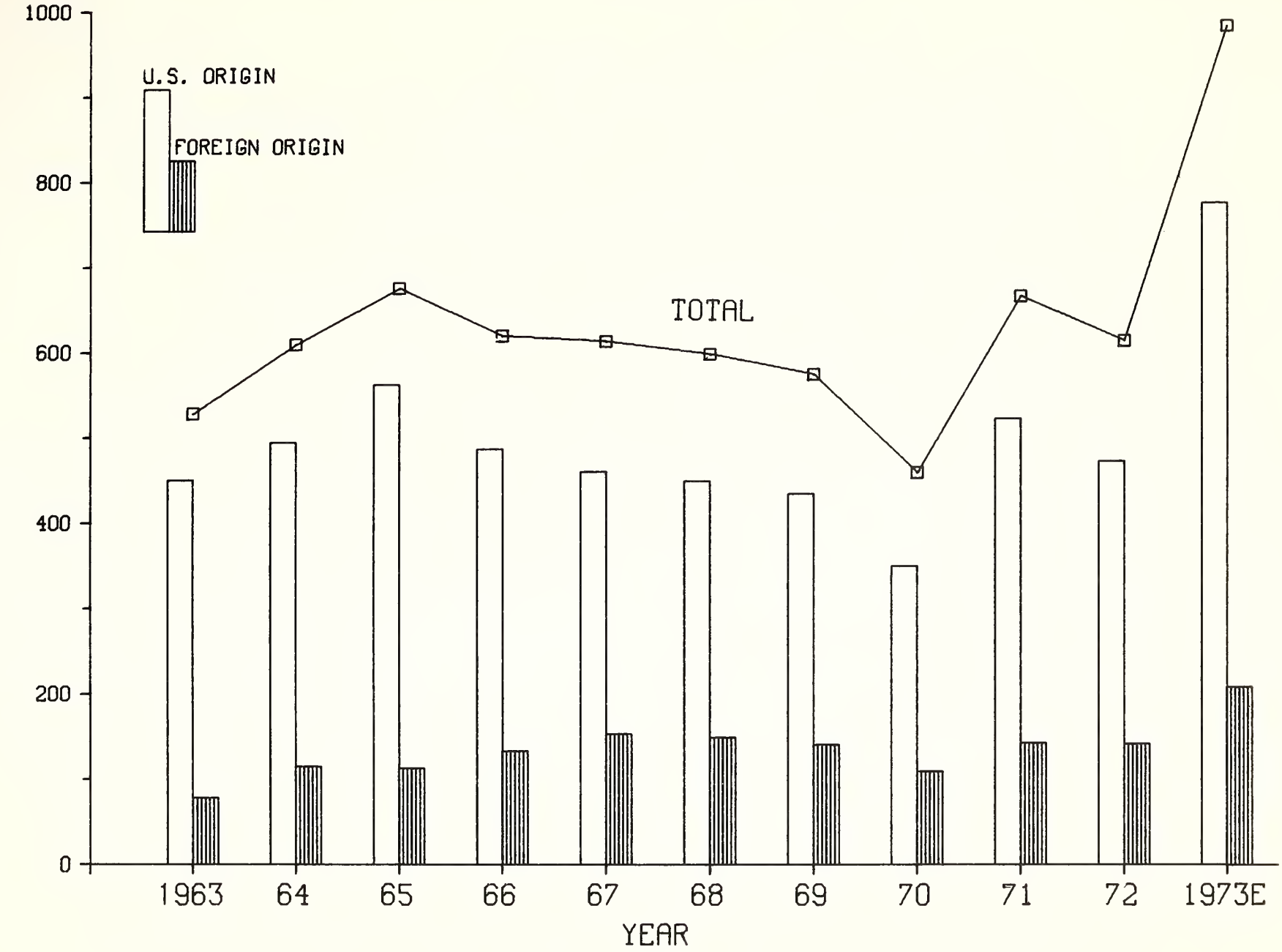
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	528	609	675	619	613	598	574	459	666	614	984
ORIGINATING IN THE UNITED STATES	450	494	562	486	460	449	434	350	523	473	776
ORIGINATING IN OTHER COUNTRIES	78	115	113	133	153	149	140	109	143	141	208
PATENTS ORIGINATING IN THE UNITED STATES	450	494	562	486	460	449	434	350	523	473	776
OWNED BY UNITED STATES CORPORATIONS	156	179	213	202	207	225	209	168	246	203	296
OWNED BY UNITED STATES INDIVIDUALS	129	132	176	131	116	109	111	85	144	112	168
OWNED BY UNITED STATES GOVERNMENT	165	182	173	149	136	115	113	94	131	156	310
FOREIGN OWNED	0	1	0	4	1	0	1	3	2	2	2
PATENTS ORIGINATING IN OTHER COUNTRIES	78	115	113	133	153	149	140	109	143	141	208
UNITED STATES OWNED	3	6	6	5	6	8	7	3	5	9	12
FOREIGN OWNED	75	109	107	128	147	141	133	106	138	132	196

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	85.2	81.1	83.3	78.5	75.0	75.1	75.6	76.3	78.5	77.0	78.9
ORIGINATING IN OTHER COUNTRIES	14.8	18.9	16.7	21.5	25.0	24.9	24.4	23.7	21.5	23.0	21.1
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	34.7	36.2	37.9	41.6	45.0	50.1	48.2	48.0	47.0	42.9	38.1
OWNED BY UNITED STATES INDIVIDUALS	28.6	26.8	31.3	26.9	25.2	24.3	25.5	24.3	27.6	23.7	21.7
OWNED BY UNITED STATES GOVERNMENT	36.7	36.8	30.8	30.7	29.6	25.6	26.1	26.8	25.0	33.0	39.9
FOREIGN OWNED	0.0	.2	0.0	.8	.2	0.0	.2	.9	.4	.4	.3
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	3.8	5.2	5.3	3.8	3.9	5.4	5.0	2.8	3.5	6.4	5.8
FOREIGN OWNED	96.2	94.8	94.7	96.2	96.1	94.6	95.0	97.2	96.5	93.6	94.2

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Ordnance, Except Missiles



AIRCRAFT AND PARTS

NUMBER OF PATENTS

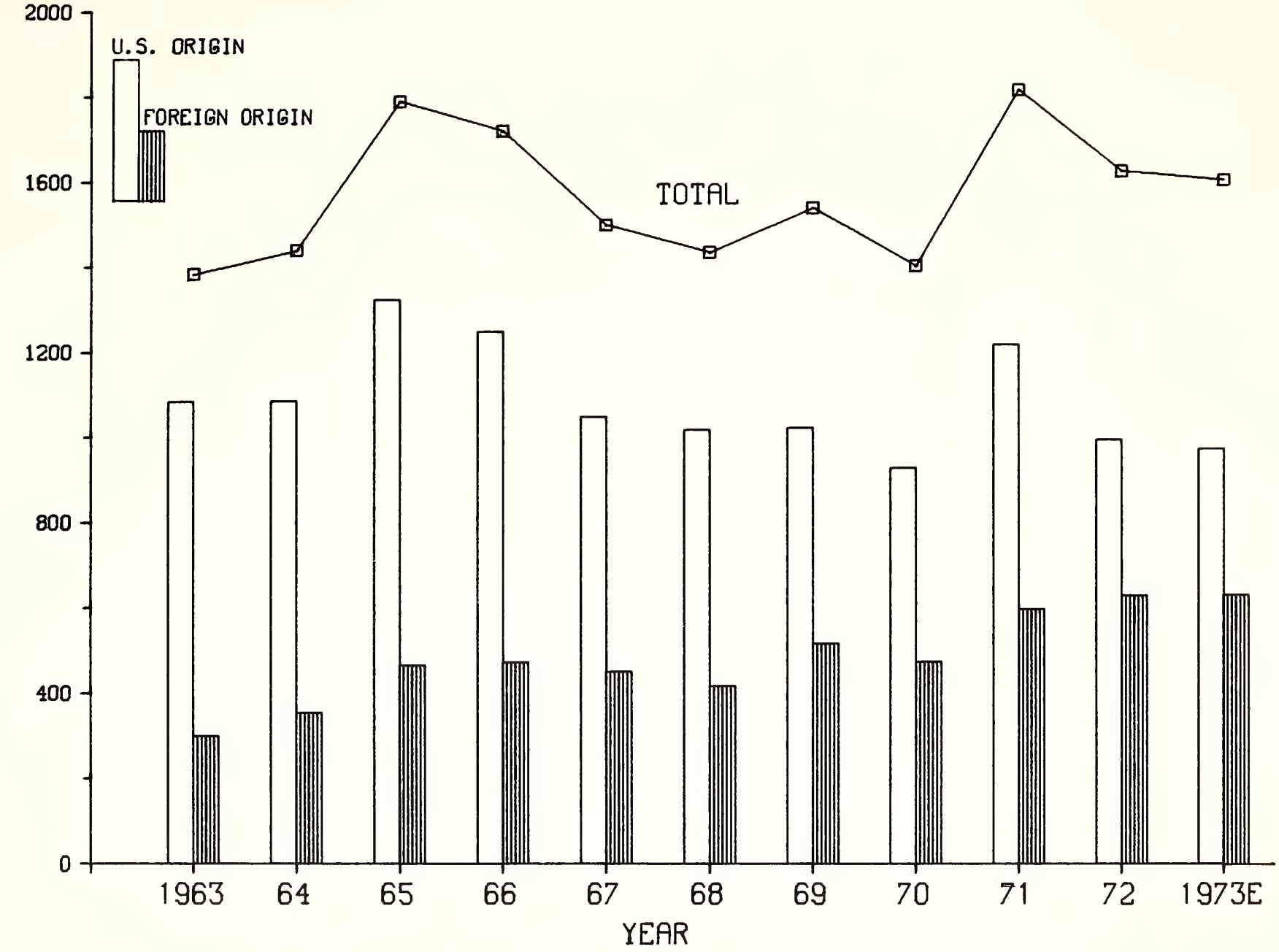
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	1383	1439	1788	1720	1499	1435	1540	1404	1819	1628	1608
ORIGINATING IN THE UNITED STATES	1083	1085	1323	1248	1048	1018	1023	930	1220	997	976
ORIGINATING IN OTHER COUNTRIES	300	354	465	472	451	417	517	474	599	631	632
PATENTS ORIGINATING IN THE UNITED STATES	1083	1085	1323	1248	1048	1018	1023	930	1220	997	976
OWNED BY UNITED STATES CORPORATIONS	721	703	818	824	680	693	689	635	874	670	672
OWNED BY UNITED STATES INDIVIDUALS	306	330	437	335	305	285	279	239	285	272	228
OWNED BY UNITED STATES GOVERNMENT	56	51	67	84	61	37	51	51	57	50	62
FOREIGN OWNED	0	1	1	5	2	3	4	5	4	5	14
PATENTS ORIGINATING IN OTHER COUNTRIES	300	354	465	472	451	417	517	474	599	631	632
UNITED STATES OWNED	11	17	15	23	20	15	22	24	39	48	46
FOREIGN OWNED	289	337	450	449	431	402	495	450	560	583	586

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	78.3	75.4	74.0	72.6	69.9	70.9	66.4	66.2	67.1	61.2	60.7
ORIGINATING IN OTHER COUNTRIES	21.7	24.6	26.0	27.4	30.1	29.1	33.6	33.8	32.9	38.8	39.3
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	66.6	64.8	61.8	66.0	64.9	68.1	67.4	68.3	71.6	67.2	68.9
OWNED BY UNITED STATES INDIVIDUALS	28.2	30.4	33.1	26.9	29.1	28.0	27.2	25.7	23.4	27.3	23.3
OWNED BY UNITED STATES GOVERNMENT	5.2	4.7	5.0	6.7	5.8	3.6	5.0	5.5	4.7	5.0	6.4
FOREIGN OWNED	0.0	.1	.1	.4	.2	.3	.4	.5	.3	.5	1.4
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	3.7	4.8	3.2	4.9	4.4	3.6	4.3	5.1	6.5	7.6	7.3
FOREIGN OWNED	96.3	95.2	96.8	95.1	95.6	96.4	95.7	94.9	93.5	92.4	92.7

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Aircraft and Parts



PROFESSIONAL AND SCIENTIFIC INSTRUMENTS

NUMBER OF PATENTS

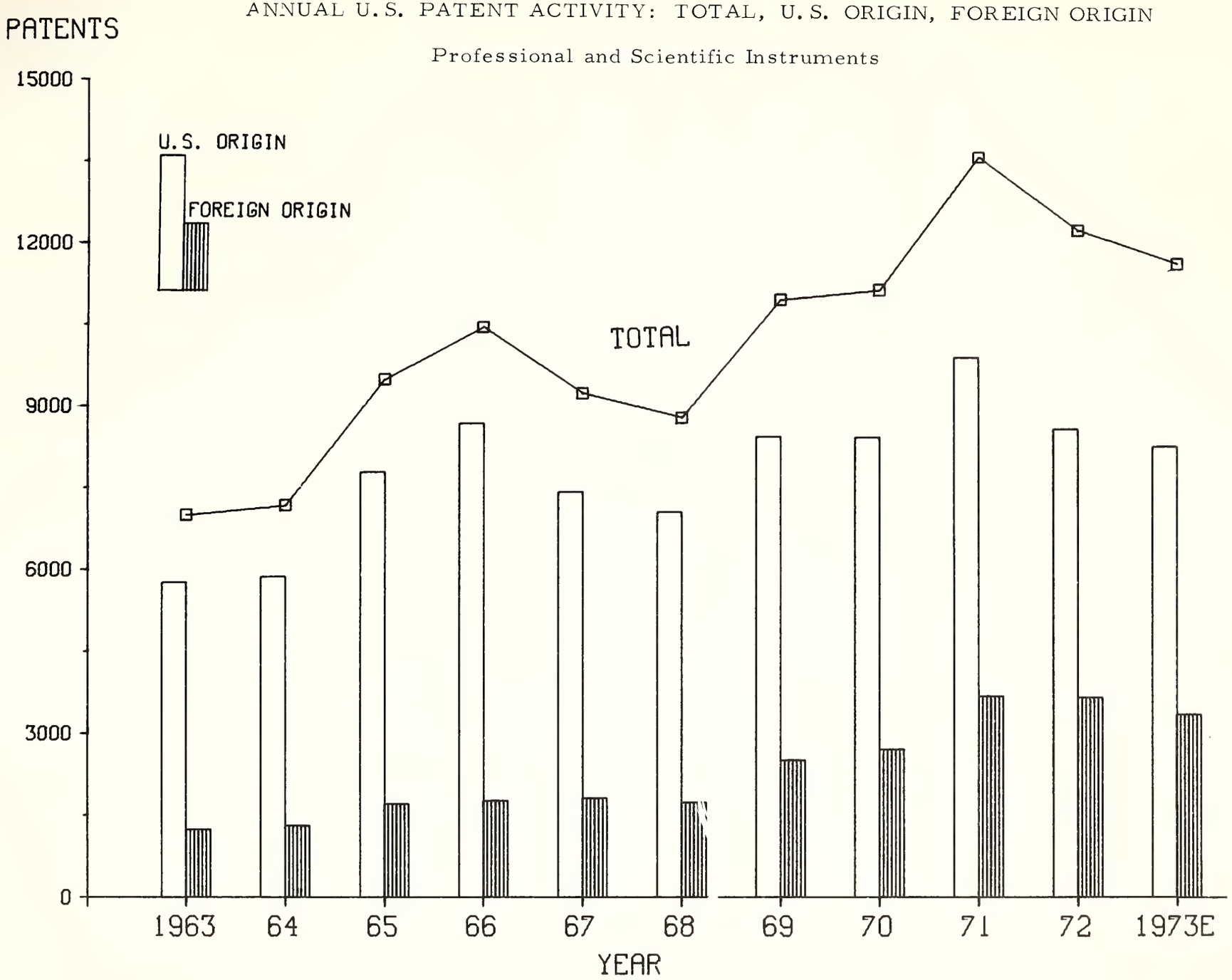
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	6990	7160	9463	10416	9203	8756	10910	11088	13520	12183	11566
ORIGINATING IN THE UNITED STATES	5754	5856	7766	8657	7401	7028	8409	8395	9854	8543	8236
ORIGINATING IN OTHER COUNTRIES	1236	1304	1697	1759	1802	1728	2501	2693	3666	3640	3330
PATENTS ORIGINATING IN THE UNITED STATES	5754	5856	7766	8657	7401	7028	8409	8395	9854	8543	8236
OWNED BY UNITED STATES CORPORATIONS	3879	4083	5416	6277	5146	4975	6002	6004	7116	5984	5796
OWNED BY UNITED STATES INDIVIDUALS	1661	1557	2052	2048	1875	1708	1943	1892	2131	2155	2010
OWNED BY UNITED STATES GOVERNMENT	209	210	289	308	362	323	440	453	520	345	384
FOREIGN OWNED	5	6	9	24	18	22	24	46	87	59	46
PATENTS ORIGINATING IN OTHER COUNTRIES	1236	1304	1697	1759	1802	1728	2501	2693	3666	3640	3330
UNITED STATES OWNED	99	117	172	223	169	181	236	251	368	264	270
FOREIGN OWNED	1137	1187	1525	1536	1633	1547	2265	2442	3298	3376	3060

PERCENT OF PATENTS

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973E
TOTAL PATENTS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ORIGINATING IN THE UNITED STATES	82.3	81.8	82.1	83.1	80.4	80.3	77.1	75.7	72.9	70.1	71.2
ORIGINATING IN OTHER COUNTRIES	17.7	18.2	17.9	16.9	19.6	19.7	22.9	24.3	27.1	29.9	28.8
PATENTS ORIGINATING IN THE UNITED STATES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OWNED BY UNITED STATES CORPORATIONS	67.4	69.7	69.7	72.5	69.5	70.8	71.4	71.5	72.2	70.0	70.4
OWNED BY UNITED STATES INDIVIDUALS	28.9	26.6	26.5	23.7	25.4	24.3	23.1	22.6	21.6	25.3	24.4
OWNED BY UNITED STATES GOVERNMENT	3.6	3.6	3.7	3.5	4.9	4.6	5.2	5.4	5.3	4.0	4.6
FOREIGN OWNED	.1	.1	.1	.3	.2	.3	.3	.5	.9	.7	.6
PATENTS ORIGINATING IN OTHER COUNTRIES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNITED STATES OWNED	8.0	9.0	10.1	12.7	9.4	10.5	9.4	9.3	10.0	7.3	8.1
FOREIGN OWNED	92.0	91.0	89.9	87.3	90.6	89.5	90.6	90.7	90.0	92.7	91.9

ANNUAL U.S. PATENT ACTIVITY: TOTAL, U.S. ORIGIN, FOREIGN ORIGIN

Professional and Scientific Instruments



APPENDIX A

OBTAINING PREVIOUS OTAF PUBLICATIONS

Copies of the four previous OTAF publications listed below are available from:

National Technical Information Service
U. S. Department of Commerce
Springfield, Virginia 22151

When ordering from this source, please give the publication title and its "COM" number.

1. Initial Publication, May 1973
COM 73-10767: Cost $3.00

   Describes OTAF program and gives sample reports on 24 wide ranging areas of technology in varying levels of detail.

2. Early Warning Report, December 1973
COM 74-10150: Cost $6.75

   Spotlights those technological areas experiencing a high level of overall activity or of foreign activity. Reviews patent activity in a number of energy areas, including nuclear; solar; geothermal; and tide, wind and wave energy.

3. Third Report, June 1974
COM 74-11383: Cost $5.50

   Presents an overview of the technological activity, across all technologies, of a group of selected foreign countries and a group of selected U. S. states. Extends energy area treatments to include oil shale and coal gasification technologies. Reviews additional high overall activity technological areas.

4. Fourth Report: A Review of Patent Ownership, January 1975
COM 75-10050: Cost $5.75

   Identifies the 73 corporations and government agencies which received 500 or more patents during the five year period 1969-1973, and reviews and compares their patent activity across the spectrum of technology. Also reviews in terms of patent ownership, the patent activity during the same period, in nuclear energy technology and oil shale and coal gasification technology.

APPENDIX B

OBTAINING ADDITIONAL INFORMATION OR SPECIAL REPORTS

Background

OTAF's computerized base of data relating to the patent file includes, at present:

- all subclasses of the U. S. Patent Classification System
- the relationship of all subclasses of the U. S. Patent Classification System to the Standard Industrial Classification System in 36 Product Fields and Product Field combinations
- for all U. S. patents, their recorded locations within the U. S. Patent Classification System
- for each U. S. patent issued since 1963,
    - . the ownership at time of issue in seven categories (U. S. government, foreign government, U. S. corporation, foreign corporation, U. S. individual, foreign individual, and unassigned)
    - . the country or state of residence of the inventor
- for U. S. patents issued since 1969, the specific (i. e. named) ownership of all which are organizationally owned (e. g. by a corporation, foundation, government agency)

Data can be retrieved on the basis of any one or any combination of the factors listed above, manipulated on most any given basis and presented in a number of formats, e. g., lists, tables, graphs, charts, etc. This flexibility is illustrated by the various types of reports presented in this and the four preceeding OTAF publications.

How to Obtain Special Reports

1. In making an initial determination of interest in a special OTAF report, you are urged to review the data items that are available and decide if any one or combination of them, or any relationship between two or more of them might be useful to your needs.

2. In most instances, interest, once determined, will be limited to particular technological areas. The definition of these areas is of key importance and must ultimately be in terms of classes and subclasses of the U.S. Patent Classification System (or one of the 36 SIC Product Fields or Field combinations). If you are unfamiliar with the U.S. Patent Classification System, develop as clear and precise an explanation of your area(s) of interest as possible.

3. At this point, you should contact OTAF, indicate the type of information your desire and, if you wish, what your needs are. (Perhaps alternatives can be suggested to better meet those needs). If you cannot provide class and subclass definition of your area of interest, OTAF will attempt to do that for you, using your description of the area.

4. Once there is a clear mutual understanding of the information you want, the format in which you want it and the area(s) to be included, an estimate of cost will be developed and provided to you along with a statement of the work to be done.

5. Once agreement on work to be done and cost is reached, and payment is received, the report will be prepared and provided.

Costs

All special reports are prepared on a cost reimbursable basis. These costs may vary widely - from as low as $200 to $300 for a statistical report (including a list of covered patents) of the type contained in Section I of this publication, to several thousand dollars for complex and large scale treatments of many technological categories, requiring extensive programming or computer time; or for in-depth reports which focus on the substantive content of the covered patents and require substantial professional analysis time.

Whom to Contact

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